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SOME OBSERVATIONS ON THE EPIDEMIOLOGY OF LUNG CANCER.

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From the Central Cancer Registry, Anti-Cancer Council of Victoria.

Epidemiology is the study of disease—any disease—as a mass phenomenon.—GREENWOOD.

IN this paper we shall be dealing with the epidemiology of primary malignant disease of the lung (bronchial carcinoma)—a subject that is currently much in the news, with space in the daily papers as well as in the medical Press. An apprehensive public has been stirred by the increasing number of deaths ascribed to this disease and by the disagreeable announcement that habitual smoking is a causative factor. This uneasy state of mind is but one phase of the popular reaction to cancer. There is a sense of threat to the health, happiness and efficiency of organized society, and a tacit appeal to organized medicine for enlightenment, guidance and protection. The appropriate academic discipline is epidemiology, the discipline that links medicine with demography.[1]

[1] "Demography" is a term denoting the study of human populations by statistical methods, and deals with such questions as the numbers of people living, dying or being born in a country or region. Demographers are primarily concerned with the size and growth of a population; with its distribution by age, sex, occupation and geographical area; with migration and marriage; with mortality and morbidity; with the calculation of birth rates and death rates; with the delineation of population trends and the provision of estimates applicable to future years.

The late Professor Greenwood, in his book "Epidemics and Crowd-Diseases", used the term epidemiology as meaning the study of disease—any disease—as a mass phenomenon.

> Epidemiology differs from the study of disease by a clinician primarily in respect of the unit of investigation. A clinician is concerned with, say, tuberculosis of the lung from the point of view of the individual patient; an epidemiologist is concerned with a *prevalence* of tuberculosis of the lung and the measures (medical and administrative) that should be taken to reduce that prevalence.

In no uncertain terms, Greenwood hammers home the point that the statistical method is essential to the work of the epidemiologist, "as essential as skill in manual diagnosis or the use of clinical instruments to the clinician".

These quotations indicate the main lines of inquiry for us to follow. We need to know (i) the frequency of occurrence or extent of bronchial cancer as a crowd disease, and (ii) the measure of success or failure attending methods of control. In the final analysis both questions are quantitative in character; hence the fundamental importance of vital statistics and medical records. The raw material of statistical medicine consists of records. As Crew (1948) puts it:

> The human animal cannot be deliberately subjected to controlled experimentation but he is unique in that records concerning his behaviour can be and are maintained.

Frequency of Occurrence.

General Considerations.

Is cancer of the lung rapidly spreading, and if so why? The frequency of occurrence, or extent, of an endemic disease is a purely relative concept; it can be thought of only in connexion with a particular social aggregate (nation, community, family *et cetera*) during given time-intervals. A distinction may be drawn between the prevalence of a disease and its incidence. Whereas case incidence is the frequency of occurrence of new cases during successive time intervals, case prevalence is the sum total of all cases under observation at any one time. Prevalence data are spoken of as cross-section or static data; incidence data are known as longitudinal or progressive. Dividing case prevalence by the number of persons at risk, we get a ratio indicative of "disease density"; dividing case incidence by the number of persons at risk, we get a ratio indicative of "disease momentum". These ratios, when multiplied by a constant—say 100,000 or 1,000,000—are referred to as morbidity rates. It is a convention of vital statistics that annual rates are intended unless otherwise stated.

The business of enumerating disease frequencies in a finite population presupposes effective arrangements for notification and registration of every case as soon as it is recognized. These arrangements are almost universal for communicable diseases, but not so for cancer. Nevertheless, specially planned cancer surveys, covering selected areas and groups, are current in many parts of the world, including Australia. In the State of Victoria one of the functions of the Central Cancer Registry[1] is to determine cancer frequencies in the public hospital population. This involves collection of both prevalence and incidence data. Thus, on May 5, 1948, a census of 69 hospitals gave the following results (Table I).

TABLE I.

Census of Cancer Patients in Victorian Public Hospitals, May 5, 1948.

Type of Hospitals.	Bed State.		
	(*a*) Cancer Cases.	(*b*) Bed Capacity.	(*c*) Ratio (*a*) : (*b*).
Metropolitan ..	209	2525	1 : 12
Country	55	1785	1 : 32
Total ..	264	4310	1 : 16

Table I represents the result of an isolated inquiry over and above the normal routine of the registry. During ten working years, the work of the registry has been mainly directed towards compilation and analysis of a detailed record of cancer experience at six public hospitals in Melbourne.[2] A summary of this experience with special reference to the case incidence of bronchial carcinoma will be found in Table II. This summary of hospital experience discloses that admissions for bronchial cancer have more than trebled during the last decade. Throughout the series the ratio of male to female patients has never been less than 4:1. At the same time the ratio of bronchial cancer patients to all cancer patients has increased from 1:38 in 1940-1941 to 1:15 in 1952-1953. Replicate samples from other Australian centres would probably show the same thing, but there is no reason to suppose that these findings are typical of the community in general. Statistics drawn from an arbitrarily selected group of people are prone to exhibit peculiarities and bias all their own; for instance, the sample under discussion may be considerably overburdened with cases of bronchial carcinoma, owing to the fact that several of the hospitals concerned conduct active thoracic surgery clinics. Under these circumstances we must look further afield for confirmation of statements to the effect that cancer of the lung is on the increase, and that "at the present time the lung is one of the commonest sites in the human body for primary as well as for secondary malignant disease" (Smithers, 1953). These statements require investigation on a national scale.

TABLE II.

The Combined Cancer[1] Experience of Six Public Hospitals in Melbourne, with Special Reference to the Case Incidence of Bronchial Carcinoma.

Site of Primary Growth.	1940 to 1941.	1946 to 1947.	1948 to 1949.	1950 to 1951.	1952 to 1953.
Males :					
(*a*) Lung ..	77	101	183	178	262
(*b*) All sites..	1819	1910	2075	2255	2251
(*c*) Ratio (*a*) : (*b*) ..	1 : 24	1 : 19	1 : 11	1 : 13	1 : 9
Females :					
(*a*) Lung ..	18	20	45	44	63
(*b*) All sites..	1767	1845	2234	2331	2653
(*c*) Ratio (*a*) : (*b*) ..	1 : 98	1 : 92	1 : 49	1 : 53	1 : 42
Persons :					
(*a*) Lung ..	95	121	228	222	325
(*b*) All sites..	3586	3755	4309	4586	4904
(*c*) Ratio (*a*) : (*b*) ..	1 : 38	1 : 31	1 : 19	1 : 21	1 : 15

[1] The term "cancer" as used here is equivalent to "malignant growth" of any kind, including leuchæmia and Hodgkin's disease.

National Statistics of Lung Cancer.

In the Australian States, as in other countries, lung cancer does not come within the category of notifiable disease; hence it is not possible directly to determine national morbidity rates. None the less, an indirect determination may be made on the assumption that case fatality in this disease is practically 100%—an assumption which has hitherto proved only too well founded. This means that, except for an indeterminate time lag between onset of disease and death, the long-term trend of mortality may be used as a measure of the incidence of lung cancer.

A synopsis of Australian mortality data for primary growths of the lung will be found in Table III. When we scan the figures, the first point to notice, in column (2), is the great increase in the number of deaths ascribed to cancer of the lung over the last forty years. By 1950, doctors in Australia were writing "cancer of the lung" on death certificates about 27 times more often than they had been doing in 1910. This point is graphically shown in Figure I (*a*). Although we cannot disregard absolute differences of such magnitude, it is desirable more precisely

TABLE III.

Bronchial Cancer Mortality, Australia, 1908 to 1952.[1]

(1) Period.	(2) Average Annual Deaths.	Average Rate per Million Living.			(6) Sex Ratio, M. : F.
		(3) Persons.	(4) Males.	(5) Females.	
1908 to 1912	31	6·9	8·6	5·3	1·6 : 1
1913 to 1917	41	8·2	9·3	7·1	1·3 : 1
1918 to 1922	56	10·5	12·4	8·4	1·5 : 1
1923 to 1927	83	13·9	15·0	12·7	1·2 : 1
1928 to 1932	115	17·7	22·1	13·1	1·7 : 1
1933 to 1937	188	27·8	36·9	18·5	2·0 : 1
1938 to 1942	293	41·4	60·3	22·2	2·7 : 1
1943 to 1947	418	55·9	86·0	25·8	3·3 : 1
1948 to 1952	760	91·1	147·3	34·0	4·3 : 1

[1] Source of data, *Demography Bulletin*, Commonwealth of Australia.

[1] The Central Cancer Registry, jointly sponsored by the Anti-Cancer Council of Victoria and six public hospitals in Melbourne, commenced collecting clinical cancer statistics in 1940, and except for a wartime break of four years has continued to do so ever since.

[2] The Royal Melbourne Hospital, the Alfred Hospital, Saint Vincent's Hospital, Prince Henry's Hospital, the Royal Women's Hospital and the Austin Hospital. All except the Austin Hospital are clinical schools in the University. The combined daily bed state of the six hospitals averaged 2500 during the ten-year period.

to state the case in terms of relative numbers, because during the last forty years the population has grown considerably and changes have occurred in its age and sex composition. These demographic movements make it necessary to compute rates of mortality, not only for the population as a whole, but for each sex separately and for specified age groups.

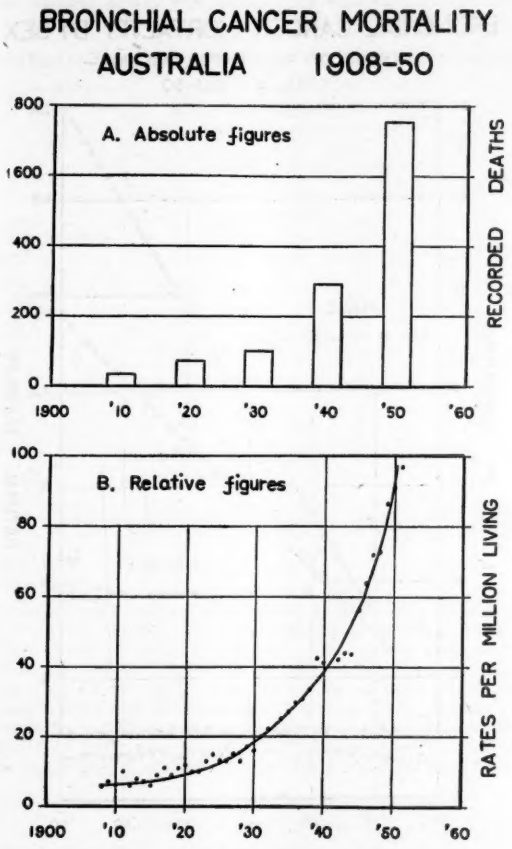

FIGURE I.

Basic data on lung cancer frequency in Australia: A, decennial plots of actual number of decedents; B, successive plots of crude death rate with curve fitted by inspection.

The next chart, Figure I (*b*), shows the complete series of bronchial cancer death rates for the population as a whole during the forty-five years from 1908 to 1951 plotted on an ordinary arithmetic grid. It will be seen that the data can be represented by a smoothed curve with an increasingly steep upward trend as the years go by. Commencing at about six deaths per 1,000,000 persons living in 1908, the rate rises to slightly over 96 per 1,000,000 in 1951—that is, 16 times what it was in 1908. The shape of the curve suggests that this rise is exponential[1] in character—and so it proves to be. This means that the death rate increases from one year to the next in geometrical progression,[2] a fact which is well brought out by replotting the data in logarithmic form, whereupon the trend may be fairly represented by a straight line (Figure II).

[1] A typical exponential curve is the curve depicting the growth of a sum of money at compound interest.

[2] The scale of natural numbers shown at the right in Figure II illustrates what is meant by geometrical progression. A geometric series is one each term of which is derived from the preceding term by application of a constant multiplier. *Per contra*, an arithmetic series changes by a constant absolute increment.

Analysis, Interpretation and Comparison of Long-Term Mortality Statistics.

The statistician, intent on analysing a particular series in time, studies his material from several points of view; he does so "in order that the past behaviour of the single series may be understood, in order that the future behaviour of the series may be predicted, or in order that two or more series may be compared" (Mills, 1938).

Having graphically displayed the drift of a lengthy series of death rates (Figure I (*b*), and having given mathematical expression to its characteristic secular trend,[1] we have gone a long way towards distinguishing the separate effects of whatever forces, accidents or episodes are shaping the course of lung cancer mortality in this country. Obviously the all-important motive force is the growth

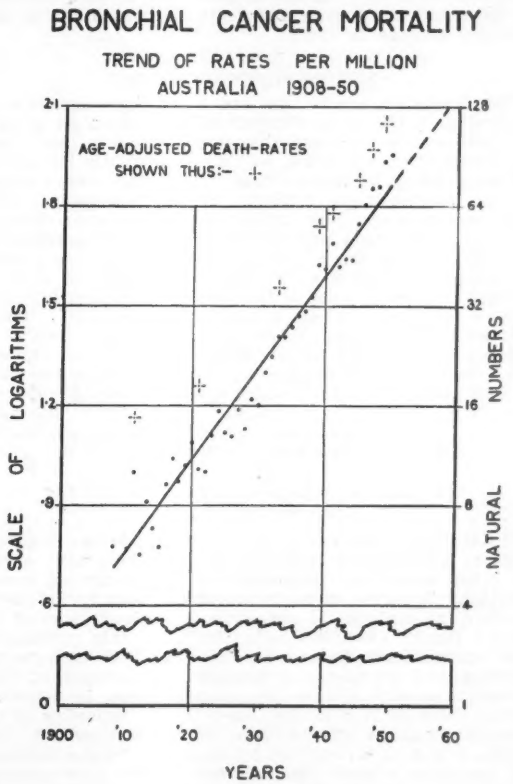

FIGURE II.

Trend of lung cancer mortality in Australia. The trend line has been mathematically fitted, the equation being: $Y = 3{\cdot}0249(1{\cdot}0661)^{x}$, origin 1900. Age-adjusted death rates are plotted for census years and for 1939, 1941, 1945 and 1949.

factor, or combination of factors, underlying the well-defined upward trend. Using trend values as "normal" points of reference for isolating the effects of influences other than the growth factor, we are left with an uneven scatter of random fluctuations mainly congregated in the earlier serial years (Figure II). These irregular fluctuations, superimposed upon trend, are doubtless brought about by intercurrent events and circumstances fortuitously associated with the main ætiological factors of lung cancer epidemiology. Whilst we recognize the presence of these

[1] By secular trend is meant the smooth, regular, long-term movement of a statistical time series.

irregular and relatively minor fluctuations, it is important to recognize the absence of periodic fluctuations resembling those impressive "epidemic" waves so characteristic of an acute infectious crowd disease.

Bearing in mind our previous proposition that for epidemiological purposes the morbidity incidence of bronchial cancer may be counted as commensurate with the corresponding mortality rates, we may now proceed to summarize our interpretation of Australian figures for this disease. As far as we have gone, statistical analysis of crude death rates appears to indicate: (i) that the frequency of occurrence of bronchial cancer has undergone a remarkable increase during the last forty-odd years; (ii) that the incidence of this disease has increased by a more or less constant percentage each year; (iii) that the uniform pattern of increase has been slightly disturbed by irregular deviations from the "normal" upward trend, but there has been no evidence whatsoever of epidemic cycles; and (iv) that the projected trend of the disease is such that, unchecked, bronchial cancer will steadily increase in frequency, the prospective death rate reaching 142 per 1,000,000 persons in 1960.

Disparity of Sex Incidence.

The foregoing conclusions are based upon analysis of Australian death rates without discrimination as to sex. On splitting the complete time series (1908 to 1951) into its sex-specific components, we find a constantly increasing disparity in sex incidence (Table III, columns (4), (5) and (6)). Mathematical analysis of the sex-specific time sequences discloses that, although each sequence exhibits an exponential trend like the parent series, the gradient or rate of climb is much steeper for male than for female mortality; calculation shows that the increase is approximately 7·7% *per annum* in the case of males and 4·6% *per annum* in the case of females (Figure III). These divergent trends mark a uniformly progressive change in the sex ratio of lung cancer, with the result that whereas the ratio of males to females was 1·2:1 in 1930, it was 2·6:1 in 1940 and 4·5:1 in 1950. Once this fact is established, we can be sure that a significant part of the increased incidence is "real" and independent of improvement in the standards of diagnosis and certification of death.

Similarity of Experience Elsewhere and the Exponential "Law".

Australian experience in these matters is by no means unique; similar and simultaneous situations have arisen in other countries. Contemporary experience of cancer mortality is set out on an international scale in Volume V of the "Epidemiological and Vital Statistics Report of the World Health Organization" (1952). In this publication the international listings for the year 1949 indicate the geographical prevalence and relative importance of "respiratory cancer" (Table IV). Furthermore, in countries where relevant records date back to the beginning of the century, such as England and Wales, Switzerland, Australia, it can be shown that for each country the incidence of bronchial cancer (as reflected in the corresponding death rates for "respiratory cancer") has increased by geometrical progression and therefore most noticeably during recent years (Figure IV). In fact, so well does an exponential curve represent the secular trend of respiratory cancer mortality in all three countries, that we may tentatively assume a definite "law" of growth underlying the phenomenon.

For such an assumption to carry any weight, we must be prepared to meet the objection that our basic data are not strictly comparable throughout the entire period for which the "law" is supposed to hold. Two factors are alleged to have disturbed the homogeneity of the series: (i) concurrent aging of the population, and (ii) substantial improvement in the art of diagnosis. The disturbing effect of shifts in the age distribution of the population (as detected at census dates) may be readily corrected by computing a series of standardized age-specific death rates. This method has already been applied by an Australian demographer (Lancaster, 1950, 1953), who found that "at every age there has been a steady increase in the rate since 1920". From this it follows that there must have been a similar increase in the age-adjusted rate for the population as a whole. Thus by computing a series of age-adjusted rates for the whole population from 1920 onward, we find that the standardized series exhibits a geometric progression in parallel with the exponential trend of the corresponding crude-rate series (Figure II). This finding

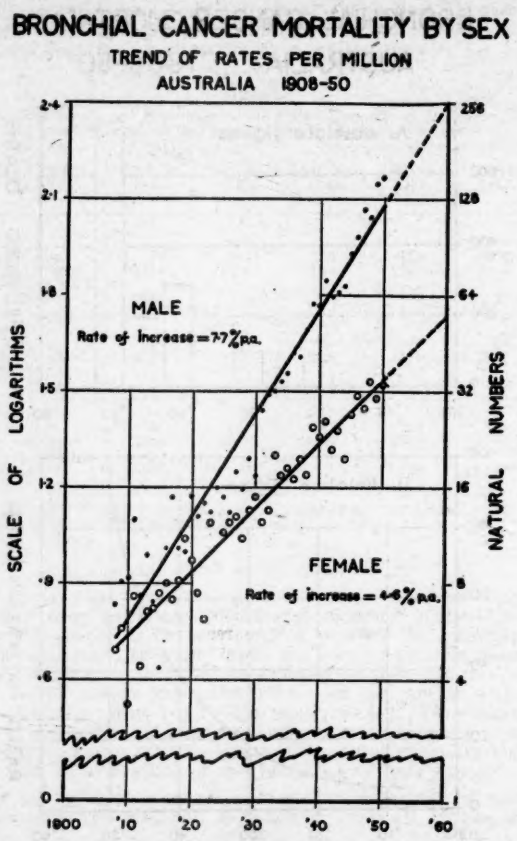

FIGURE III.

Sex-specific trends of lung cancer mortality in Australia. The trend lines have been mathematically fitted, the equations being: $Y_M = 2{\cdot}9233(1{\cdot}0767)^x$, origin 1900; $Y_F = 3{\cdot}5547(1{\cdot}0461)^x$, origin 1900. The difference in slope is highly significant ($P<0{\cdot}001$).

effectively disposes of the suggestion that in Australia the observed trend of bronchial cancer mortality has been significantly influenced by concurrent aging of the population—a finding that is all the more remarkable in view of the fact that, when due allowance is made for aging of the population during the period under review, there has been no significant increase in cancer mortality for all sites taken together (Lancaster, 1950). To compensate for the increase in bronchial cancer there has been a decline in other categories, notably cancer of the buccal cavity and lip in men (Lancaster, 1954).

On the other hand, the influence of the second factor —improved diagnosis—cannot be so precisely defined. It would be an extraordinary thing if the successive introduction of radiography, bronchoscopy, diagnostic thoracotomy and exfoliative cytology was not reflected in a more general recognition of this disease; we must not forget, however, that the doctor of forty years ago was fully possessed of that clinical judgement without which none of the modern techniques can be used to full advantage. The point at issue is whether the missed diagnoses

of yesteryear were sufficient to account for the apparent difference in prevalence between, say, 1920 and 1950. If we assume that there was no difference, then missed diagnoses in 1920 must have amounted to 88% of the presumptive total—a rather incredible assumption. The most that can be said is that, for a time, improved diagnosis did have an inflationary effect upon the recorded incidence of bronchial cancer deaths. However, this period has now passed. Modern methods of diagnosis have long since become firmly and universally established;[1] and yet

TABLE IV.

International Listing of Cancer Mortality Rates, with Special Reference to Cancer of the Respiratory Organs, 1949.[1]

(1) Country.	Rate per Million. (2) All Sites.	(3) Respiratory.	(4) Ratio of (3) to (2).
Australia	1255	103	1 : 12·2
England and Wales	1872	288	1 : 6·5
Scotland	1853	256	1 : 7·2
Eire	1391	99	1 : 14·1
Canada	1237	106	1 : 11·7
New Zealand	1398	127	1 : 11·0
South Africa	1151	110	1 : 10·5
Denmark	1568	106	1 : 14·8
Finland	1257	171	1 : 7·4
France	1680	135	1 : 12·4
Germany	1605	131	1 : 12·3
Italy	1030	72	1 : 14·3
Netherlands	1406	144	1 : 9·8
Norway	1474	63	1 : 23·4
Spain	733	67	1 : 10·9
Switzerland	1803	151	1 : 11·9
Chile[2]	815	47	1 : 17·3
United States	1387	131	1 : 10·6
Uruguay[3]	1294	171	1 : 7·6

[1] Source, "Epidemiological and Vital Statistics Report", World Health Organization, 1952. Respiratory organs include larynx, trachea, bronchus and lung.

[2] 1948 figure.

[3] 1947 figure.

the disease still gathers momentum at a steadily mounting rate. On the evidence it seems reasonable to conclude that we are dealing with a natural response to cumulative pathogenic forces rather than with a Rip Van Winkle awakening of the medical profession to an epidemiological situation that has not changed in years. This cumulative effect is both a threat and a challenge. Is the public health entirely at the mercy of these relentless forces, or can we as a community mobilize effective methods of control?

Methods of Control.

General Considerations.

Broadly speaking, the control of endemic disease is a function of social medicine—a system of curative and preventive procedures operating under the dual sanction of medical science and statecraft. During the last half century well ordered communities have taken full advantage of the technological developments of medical science, with the result that in certain localities a number of crowd diseases have virtually disappeared. Unfortunately no comparable achievement stands to the credit of the anti-cancer crusade; in the case of lung cancer the pandemic is so obviously out of control that it threatens to become a major calamity.

Reasons for lack of success in dealing with the current outbreak of bronchial carcinoma are not far to seek; curative measures are hampered by difficulties of early diagnosis as well as by the limitations of surgery and radiotherapy; preventive measures are prejudiced by uncer-

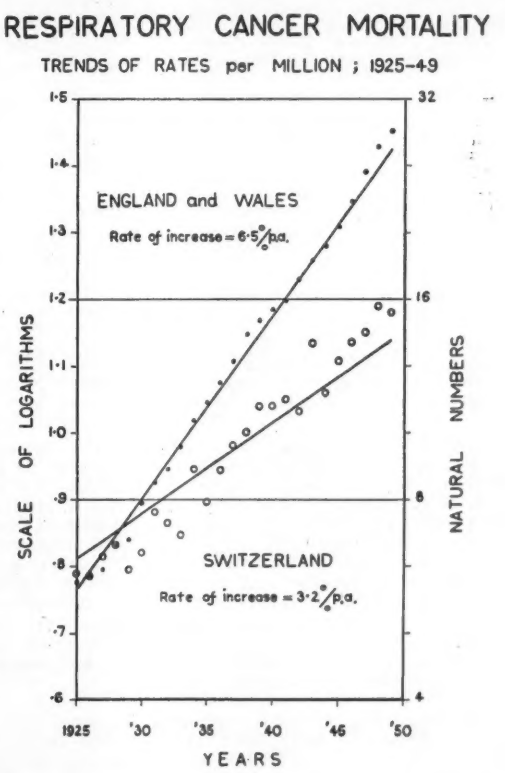

FIGURE IV.

Trends of respiratory cancer mortality in England and Wales and in Switzerland. The trend lines have been mathematically fitted, the equation being: $Y_{E+W} = 1{\cdot}2012\ (1{\cdot}0650)^x$, origin 1900; $Y_S = 2{\cdot}9799\ (1{\cdot}0317)^x$, origin 1900 (not shown in diagram). The difference in slope is highly significant ($P < 0{\cdot}001$).

tainties concerning ætiology as well as by the limitations of public administration. In the words of Payling Wright (1950):

> In both clinical and preventive medicine it is now fully appreciated that prophylaxis and rational therapeutics in disease are necessarily based on a knowledge of causes, and that where these causes are unknown there is no adequate method of prevention, and treatment must remain empirical and symptomatic.

Until such time as predisposing, precipitating and perpetuating causes can be elucidated and eliminated, the onus of treating endemic cancer will continue to rest heavily upon surgeons and radiologists. Both surgeons and radiologists are well aware that results of treatment in visceral cancer do not measure up to the requirements of epidemiological control; but at least their efforts are rewarded by individual cures and palliation. Hitherto case fatality in lung cancer has been assessed at 100%, but

[1] "In the same year that Wilhelm Konrad von Roentgen (1895) discovered X-rays, Gustav Killian used an endoscopic instrument to remove a piece of bone from a bronchus and in 1898 first wrote about his method of direct bronchoscopy. This was demonstrated in England in 1902. It was in 1917, when Chevalier Jackson first removed a tumour bronchoscopically, that the importance of this procedure as a means of diagnosis of bronchial neoplasms was recognized, but it was not until the 1930's that bronchoscopy became a common form of examination even in special chest hospitals." (Smithers.)

In 1922 Sicard and Forestier first introduced "Lipiodol" as a contrast medium for bronchograms and thereby considerably amplified the usefulness of thoracic radiography. In 1925 Dr. J. F. Mackeddie brought this method to Melbourne, and since then the number of chest X-ray films and bronchograms produced in Victoria has steadily risen until now it runs into many thousands per year.

In 1932 Evarts Graham of St. Louis, U.S.A., performed the first successful pneumonectomy for bronchial carcinoma. At first the importance of Graham's achievement was not generally appreciated; but with the end of World War II and the advent of appropriate anæsthetic techniques special departments of thoracic surgery soon developed in major medical centres.

The extent to which verification of diagnosis nowadays depends upon special methods is indicated in Table VI. It will be seen that modern hospitals accept about 5% of diagnoses based upon unconfirmed evidence of the unaided senses. This does not alter the fact that now as always most patients seek advice on the score of premonitory symptoms (Table VIII); in the matter of case detection the initiative still rests with the patient.

today this assessment is not strictly accurate; the perfection of thoracic surgery has meant that in a goodly proportion of carefully selected early cases the patients may be saved by resection of the lung, with or without auxiliary X-ray therapy (Table V).

However, it is evident that extensive ablative surgery and megavolt machines can have little effect upon the over-all prevalence of bronchial carcinoma so long as most patients are beyond surgical redemption when the condition

Table V.

Five-Year Survivorship in Visceral Cancer.[1]

(1) Site of Primary Growth.[2]	(2) Number of Patients Presenting.	(3) Number of Patients Treated by Resection.	(4) Number of Five-Year Survivors.	Percentage Survival Rates.[3] (5) A.	(6) B.	(7) C.	(8) Untraced.[4]
Stomach ..	687	126	22	3	17	22	6 (1%)
Colon ..	559	250	60	11	24	27	50 (9%)
Rectum ..	445	168	57	13	34	40	20 (5%)
Lung ..	302	25	11	4	44	50	3 (1%)

[1] Source, six public hospitals, Melbourne: 1940, 1941 and 1946, 1947, 1948.

[2] Column 1 gives a list of visceral cancers in which the prospect of cure is entirely dependent upon ablative surgery. The survivors shown in column 4 were all treated by resection and the diagnosis was histologically proven in all cases.

[3] Percentage survival rates are calculated to the nearest round number by the use of the same numerator but a different denominator for each of A, B and C, thus: rate A (column 5) is the number of five-year survivors expressed as a percentage of all patients presenting; rate B (column 6) is the number of five-year survivors expressed as a percentage of all patients treated by resection; rate C (column 7) is the number of five-year survivors expressed as a percentage of all patients leaving hospital alive after treatment by resection.

[4] All untraced patients (column 8) are considered as dead.

is first diagnosed (Figure V). Even were this not so, the drastic nature of radical treatment would give us pause to reflect that "prevention is better than cure"—a reflection which emphasizes the great importance of publicising the positive association of lung cancer and tobacco smoking so convincingly shown by Richard Doll and Bradford Hill (1950, 1952, 1953, 1954). Notwithstanding the promising prospect of preventing lung cancer by timely regulation of smoking and other inhalational hazards, it is clear that organized communities are still committed to current methods of treating overt disease, and that public health authorities are still expected to appraise and assist the work of clinical management.

Statistical Appraisal of Hospital Experience in Melbourne during 1940, 1941 and 1946–1953 (Inclusive).

The contribution of clinicians to epidemiology may be said to consist of the accumulated experience of disease as it affects consecutive series of patients. In certain hospitals, especially clinical schools, the traditional repository for this experience is the medical records library, where routine case histories are systematically filed and preserved. Provided the original records are adequate, organization and analysis of this material by statistical methods will yield essential information on the natural history and clinical management of the several forms of cancer—for example, frequency distributions by site, sex, age, initial symptomatology, method of treatment and duration of survival. It was with these considerations in mind that the Anti-Cancer Council of Victoria established the Central Cancer Registry in Melbourne at the beginning of 1940, the intention being to give numerical expression to a codified version of the combined cancer experience of six major hospitals in the metropolitan area.

For statistical appraisal of the clinical situation with regard to bronchial carcinoma, the Registry has available a consecutive series of 1000 standardized case abstracts from which Tables VI, VII and VIII have been compiled. Table VI is a reference table from which the reader can determine the extent to which special methods enter into the diagnosis of bronchial carcinoma at the public hospitals concerned; he can also calculate various rates such as the masculinity rate (80·4%), thoracotomy rate (19·3%) and so forth. It will be noticed that less than 5% of diagnoses have been accepted on the unsupported evidence of ordinary clinical signs and symptoms; 75·4% of diagnoses have been verified by biopsy and/or necropsy. With regard to age distribution (which is much the same in either sex), it will be seen that 51·5% of all patients presenting were aged sixty years or over, but only 34·7% of the patients submitted to thoracotomy were similarly aged. Calculations carried out at the Central Cancer Registry provide the

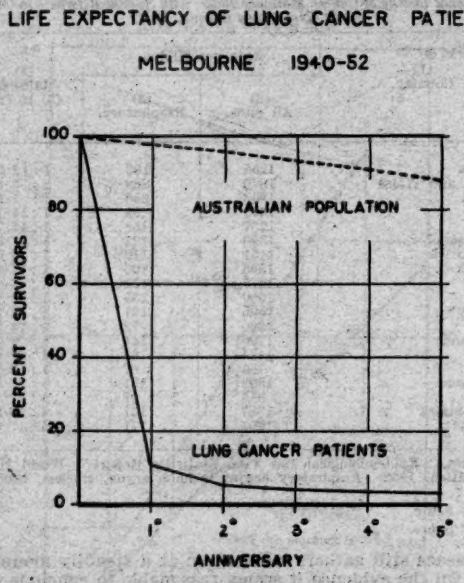

Figure V.

Life expectancy (up to five years) of lung cancer patients compared with similar expectancy in the male population of Australia. The survivorship curve for lung cancer has been derived from the Melbourne sample of patients with a mean age of fifty-nine years on admission to hospital; the curve for the population at large is derived from Commonwealth Life Tables (1947), and shows the gradient of mortality in a cohort of 100 males aged fifty-nine years at entry. Both curves have been cut short at the fifth anniversary, for the reason that by then the number of cases in the lung cancer sample is too small to calculate a valid probability of surviving from the fifth to the sixth anniversary.

following statistical values: age range, fourteen to eighty-seven years; mean age, fifty-nine years, with a standard deviation of 10·6 years (Figure VI).

The histological classification of our material, as derived from biopsy and post-mortem specimens, is as shown in Table VII.

Table VIII gives a summary analysis of prodromal symptomatology, together with an approximate measure of urgency in terms of time lag between the first distinctive symptom and admission to hospital. Distinctive or classical symptomatology may be regarded as being dependent upon (i) excitation of reflex action (cough), (ii) bronchial blockage (dyspnœa), (iii) ulceration (hæmoptysis), and (iv) secondary infection (pneumonia). It will be observed that the classical prodromata of bronchial carcinoma display a disconcerting chronicity; in 48% of 678 patients the time lag between onset and admission to hospital is over six months, and in 27% it is twelve months or longer. Such delays account for the dearth of favourable cases reaching the surgeon in time for hopeful resection, and so long as the initiative continues to rest with the patient—as seemingly it must—there is not much prospect of earlier case finding. Although the feckless inertia of human nature is partly to blame, the real cause of delay is the insidious onset and stealthy progress of the disease. None

TABLE VI.

Basis of Diagnosis of Bronchial Cancer: Double Dichotomous Arrangement of 1000 Positive Diagnoses According to Sex, Age Group and Extent of Special Investigations.[1]

Nature of Special Evidence Supporting Clinical Diagnosis.[2]	Thoracotomy Performed: Age of Subjects in Years.						Thoracotomy Not Performed: Age of Subjects in Years.						Totals.		
	Males.			Females.			Males.			Females.					
	Under 50.	50 to 59.	60 and Over.	Under 50.	50 to 59.	60 and Over.	Under 50.	50 to 59.	60 and Over.	Under 50.	50 to 59.	60 and Over.			
X-ray evidence positive:															
Biopsy and autopsy results positive	6	12	11	2	3	2	10	18	22	1	4	5	96	312	704
Biopsy result positive, no autopsy	16	37	26	8	3	7	7	41	50	7	7	7	216		
Biopsy omitted, autopsy result positive	2	5	3	—	—	1	22	46	81	4	10	26	200	392	
Biopsy and autopsy both omitted	1	4	5	—	2	—	7	39	88	5	9	32	192		
X-ray examination omitted:															
Biopsy and autopsy results positive	2	4	1	—	—	1	4	7	9	1	1	2	32	84	296
Biopsy result positive, no autopsy	6	6	5	4	—	—	3	11	13	1	1	2	52		
Biopsy omitted, autopsy result positive	1	—	1	—	1	—	13	46	68	3	8	17	158	212	
Biopsy and autopsy both omitted	1	—	3	—	—	1	2	14	25	1	6	1	54		
Totals	35	68	55	14	9	12	68	222	356	23	46	92	Grand total 1000		
	158			35			646			161					
	193						807								

[1] Source, Central Cancer Registry, Melbourne, 1940, 1941 and 1946-1954.

[2] Note that in 368 cases the diagnosis gained additional support from positive bronchoscopic findings. This number includes 6 of the 54 cases shown in the lower part of the last column but two, which means that less than 5% of the grand total have been diagnosed on the unsupported evidence of ordinary clinical signs and symptoms.

the less, two relatively recent advances in clinical medicine have placed the possibility of early diagnosis on a much surer footing—namely, chest X-ray surveys and routine chemotherapy of pneumonic conditions. McConchie (1954) has made the following statement:

> The circumscribed opacity found in the mass X-ray survey and the area of pneumonitis that does not clear completely with chemotherapy should be regarded as possible cancer and be thoroughly investigated—there should be no hesitation about doing the final investigation of exploratory thoracotomy.

The Victorian Chest X-Ray Survey.

The natural lack of compulsive urgency about the commonplace symptomatology of bronchial cancer is a serious impediment to detection of the disease at an early stage of pathogenesis. It might be thought that skilfully persuasive public propaganda would readily overcome this difficulty, but experience teaches otherwise. A somewhat similar situation in connexion with pulmonary tuberculosis is in course of being resolved, not so much by propaganda as by mass radiography of the chest. Current schemes of case finding confidently rely upon mass radiography to uncover cryptic lesions of the lung, whether the lesions are tuberculous or of a different morbid character.

As a case-finding technique, mass radiography of the chest has already proved its worth in screening Australian army recruits and in safeguarding our hospital nursing personnel; as a non-compulsory public health measure it became available in the State of Victoria in 1948. Through the courtesy of Dr. E. V. Keogh, Director of Tuberculosis, and Dr. Alan McNaughton, of the Chest X-Ray Survey Division, we are able to publish the figures given in Table IX, from which it is apparent that, besides disclosing cases of pulmonary tuberculosis, the Chest X-Ray Survey has brought to light a number of unsuspected cancerous lesions, thereby considerably enhancing the patients' prospects of cure. However, from the point of view of lung cancer detection, it is unfortunate that those in the older age groups of the population do not patronize the mass radiography service to the same extent as the younger groups (Table IXc).

Lung Cancer and Smoking.

A guide to the smoking habits of the Australian people is to be found in Table X. From this table it will be seen that the overall consumption of tobacco remained steady at about three pounds per head during the twenty-five years from 1915 to 1940; from 1940 onwards it has undergone a phenomenal rise, reaching five pounds per head in 1950-1951. The rise during the last ten years is almost entirely

TABLE VII.

Types of Neoplasia.[1]

Classification.	Number of Cases.
Differentiated types (341):	
Epidermoid (squamous)	227 (34·5%)
Adenomatous (alveolar)	114 (17·3%)
Anaplastic types (255):	
Oat-celled and small round-celled	139 (21·1%)
Large round-celled	84 (12·8%)
Cell-type unspecified	32 (4·9%)
Indeterminate types (62):	
Carcinoma (variety unspecified)	62 (9·4%)
Total	658 (100·0%)

[1] Source, Central Cancer Registry, Melbourne, 1940-1941 and 1946-1954.

accounted for by the ever-increasing demand for cigarettes (Figure VII). It seems that post-war prosperity and abundant leisure have together created a ready market for the high-powered sales organization of the enormously successful tobacco industry. The present level of tobacco tolerance in Australia amounts to drug addiction in a big way, and as such is probably detrimental to the health of the nation (Hammond and Horn, 1954). More specifically, it is highly probable that habitual heavy smoking (especially of cigarettes) is a potent factor in the spread of lung cancer. Evidence in support of this view has been put forward mainly in Britain and the United States of

America, as the following extract from a leading article in the *British Medical Journal* (1954) will indicate:

> That there is a "strong presumption" of a causal relationship between smoking and cancer of the lung was conceded in Parliament by the Minister of Health last week. The evidence on which this opinion is based came to a head with the publication in this Journal of the paper by Doll and Bradford Hill in 1950, and was reinforced by their second paper in 1952 . . . . The evidence of some connexion between smoking and lung cancer may have received some additional support recently from the discovery by Wynder, Graham and Croniger (1953) that the experimental painting of mice with tobacco tar causes carcinoma of their skin . . . . The validity of these smoke experiments needs confirmation, and a series of somewhat similar experiments begun by the Medical Research Council 18 months ago will test the point. The strength of the evidence so far gathered together moved the tobacco manufacturers in the U.S.A. a month ago to set up a committee for research into lung cancer and smoking, and now British manufacturers have followed with the offer of a donation of £250,000 to the Medical Research Council, to be used at the Council's discretion.
>
> Though so much evidence has been provided in Britain and the U.S.A. showing that some connexion exists between smoking and lung cancer, relatively much more is needed before a clear understanding of the connexion is obtained . . . . On the other hand the principal and more positive facts known about lung cancer and smoking are broadly two: first, there is some kind of causal connexion; secondly, the risk increases with the amount smoked. In addition, cigarettes seem to carry a greater risk than pipes and cigars, and the risk attached to cigarettes may possibly be diminished by the use of filter tips or cigarette holders. At a press conference held last week the Minister of Health wisely pointed out that it is not his duty or his Ministry's to speculate on the significance of the published reports, and he emphasized that research must be pursued with all vigour and speed. He considered the time had not yet come when the Ministry should issue public warnings against smoking.

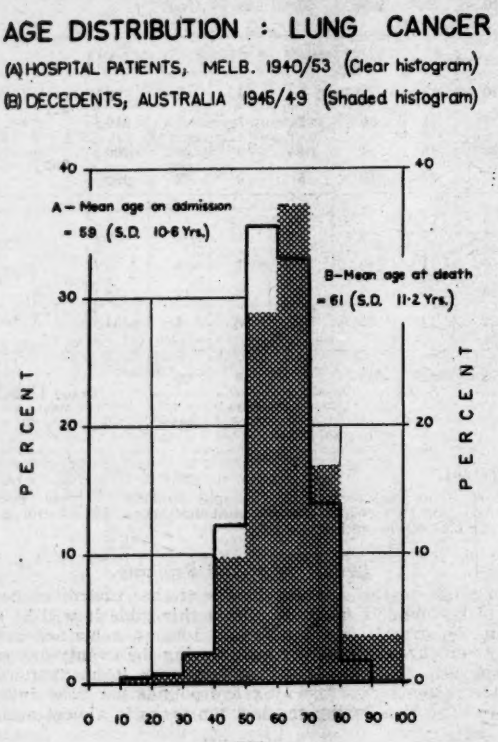

Figure. VI.

Age distribution of the lung cancer population in Australia. The superimposed histograms delineate in ten-year age groupings (i) a sample distribution of patients' ages on admission to hospital (clear histogram), and (ii) a sample distribution of age at death of lung cancer decedents (shaded histogram).

Table VIIIa.

Summary of 1000 Case Histories with Reference to Diagnostic Significance of the First Symptom.[1]

First Symptom Recorded.		First Symptom Not Recorded.	
Condition Indicated by Prodrome.	Number of Patients.	Manner of Discovery of Disease.	Number of Patients.
A wasting disease ..	78	Fortuitously discovered	14
A pulmonary lesion ..	698	Diagnosed *post mortem*	86
A distant metastasis ..	22	Otherwise determined ..	9
No significant abnormality	93		
Total	891		109

[1] Source, Central Cancer Registry, Melbourne, 1940-1941 and 1946-1954.

The above-mentioned revelation of Britain's attitude towards the question of lung cancer and smoking contains much to interest upholders of the supreme law—"*Salus populi suprema lex*". For example, the statement stresses the importance of well-planned statistical research in defining and explaining problems of epidemiology; it attaches considerable significance to the likelihood that habitual smoking is blameworthy and to the assertion that tobacco tar is carcinogenic; it foreshadows a conflict between financial interests and the postulates of public health; and last, but not least, it lays bare the limitations of conservative statecraft in the field of cancer control.

Possibilities of Prevention.

Faced as he is with the responsibility of stemming the rising tide of lung cancer, the health minister's lot is not a happy one—in whichever country we find him. No reliance can be placed upon curability as a means of epidemiological control, and people, both medical and lay, are unaccustomed to think in terms of preventibility. None

Table VIIIb.

Details of 698 Patients in Whom the First Symptom Indicated a Pulmonary Lesion, Together with an Approximate Measure of Urgency in Terms of Time Lag between Onset and Admission to Hospital.

Details of Pulmonary Prodromata.	Time-lag Distribution.					
	Under 3 Months.	3 to 6 Months.	6 to 9 Months.	9 to 12 Months.	Over 12 Months.	Not Stated.
Cough: 313 patients	63	86	53	18	89	4
Dyspnœa: 135 patients	32	30	25	2	41	5
Thoracic pain: 122 patients	35	40	15	4	27	1
Hæmoptysis: 77 patients	19	20	14	1	21	2
Pneumonia: 51 patients	10	17	3	6	8	7
Pulmonary prodromata: 698 patients ..	159	193	110	31	186	19

the less, "cancer of the lung has now come into the field of preventive medicine" (Stocks, 1953). To quote once again from the *British Medical Journal* (1953):

> Few now doubt that abolition of the cigarette, or abstinence from its use, would be the most beneficent single step in cancer prevention available to us today.

TABLE IXA.

Case Finding by Mass Radiography: Findings.[1]

Findings.	Urban.	Rural.	Total.
Cancerous lesions ..	164	82	246
Other lesions	24,051	12,553	36,604
No abnormality discovered	1,056,787	610,523	1,667,310
Total examinations[2]	1,081,002	623,158	1,704,310

[1] Source, Victorian Chest X-ray Survey, 1948–1953.

[2] "Total examinations" is not equivalent to "total persons", as many people were reexamined at intervals.

Taking one consideration with another, it seems that a ministerial warning on the cigarette menace would be wise. To quote again from Stocks (1953):

> Experience has shown that when the public conscience has become thoroughly aroused about . . . a particular death rate . . . that death rate has tended to come down whether or not the [precise] pathology was properly understood.

TABLE IXB.

Distribution of Cancerous Lesions by Age and Sex of Patients.

Age Group. (Years.)	Males.	Females.	Total.
15 to 24 ..	2	2	4
25 to 34 ..	3	5	8
35 to 44 ..	14	6	20
45 to 54 ..	34	20	54
55 to 64 ..	55	25	80
65 and over ..	50	30	80
Total ..	158	88	246

Whatever may be the final outcome of the tobacco question, we must not lose sight of the fact that other inhalational hazards are suspected of being ætiologically associated with cancer of the lung (Willis, 1953). Of particular interest to Australia at the present time, when uranium fields are about to be exploited, is the well-known "miner's disease" afflicting workers in the nickel, cobalt and uranium mines of middle Europe. This fatal disease of the lung has been recognized for centuries, but only within relatively recent times has it been clearly defined as bronchial carcinoma. About three-quarters of the Schneeberg miners and nearly half of the Joachimstal miners die of this disease. The air in the mines contains not only iron, cobalt, nickel and silica dusts, but also radioactive substances, especially radon. Miners themselves state that the discovery of a rich uranium vein is always followed some years later by a strongly increased mortality among them (Pirchan and Sikl, 1932).

TABLE IXC.

Different Age Distributions of Mass Radiography Patrons and the Victorian Population.

Categories.	Percentage Distribution by Age. (Years.)			
	15 to 49.	50 to 59.	60 and Over.	All Ages.
(a) Mass radiography patrons	80·9	10·6	8·5	100·0
(b) Victorian population (1947)	67·7	15·0	17·3	100·0
(c) Difference (a)–(b) ..	+13·2	−4·4	−8·8	—

TABLE X.

Tobacco Consumption in Pounds per Head of Population, Australia, 1915–1916 to 1950–1951.[1]

Year.	Pipe Tobacco.	Cigars.	Cigarettes.	Total.
1915–1916 ..	2·128	0·116	0·663	2·907
1920–1921 ..	1·975	0·114	0·969	3·059
1925–1926 ..	2·289	0·093	0·931	3·312
1930–1931 ..	2·076	0·052	0·706	2·834
1935–1936 ..	2·193	0·034	0·783	3·010
1940–1941 ..	2·205	0·033	0·990	3·227
1945–1946 ..	2·233	0·017	1·069	3·319
1950–1951 ..	2·566	0·028	2·399	4·994

[1] Source, Commonwealth Statistician.

Whether any or all of the other atmospheric contaminants, allegedly associated with the ætiology of lung cancer in other parts of the world, can be incriminated under Australian conditions is impossible to say. It must be remembered that about 60% of the Australian population is accommodated in the large cities and is exposed to the "chemicalized" environment of modern life. "Smog" is not a feature of this environment; but it would not be surprising to find petrol fumes, bitumen products, dis-

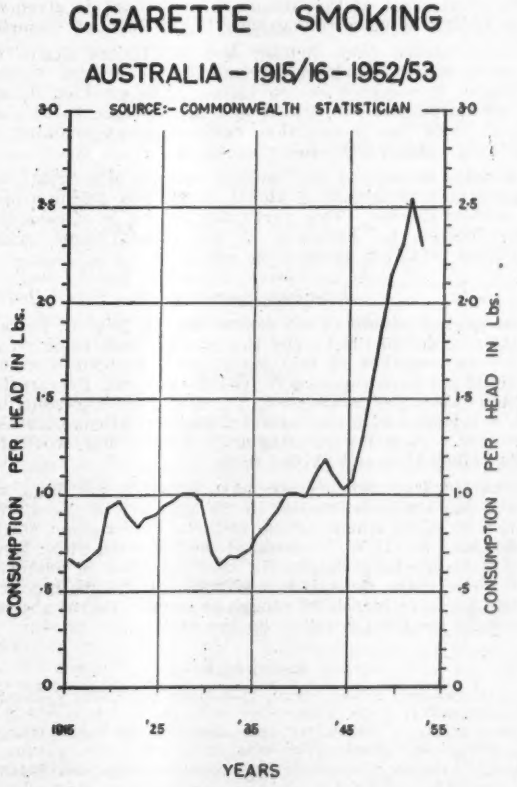

FIGURE VII.

Trend of cigarette consumption in Australia.

infectant aerosols *et cetera* acting as bronchial irritants, carcinogens or co-carcinogens, as the case may be. These and many other questions afford ample opportunity for local epidemiological research.

Summary.

In commenting upon epidemiological aspects of lung cancer in the Australian community, reference is made to (i) national mortality statistics, (ii) clinical statistics from the Central Cancer Registry, Melbourne, and (iii) selections from current medical literature.

It is found that in Australia the incidence of lung cancer (bronchial carcinoma) is increasing at a uniform rate—7·7% *per annum* for males and 4·6% *per annum* for females. The rate of increase differs from that in other countries, but the exponential pattern is the same.

Reasons are given for the opinion that the increasing frequency is largely independent of improved methods of diagnosis and of changes in the age composition of the population; a significant part of the increase is due to cumulative pathogenic forces which are almost certainly environmental in origin. The importance of this conclusion is that it holds out hope for prevention.

Methods of epidemiological control are considered under two main heads, (i) curative measures and (ii) preventive measures. A detailed analysis of the clinical features of 1000 case histories illustrates the difficulties of early diagnosis and the limitations of ablative surgery in dealing with overt cases of the disease. An account is given of case finding by mass radiography in the State of Victoria.

The evidence from Britain and the United States of America which incriminates smoking as a lung cancer pathogen is regarded as convincing. The smoking habits of Australians are described and are thought to be consistent with the theory that habitual heavy smoking is similarly blameworthy in this country.

Mention is made of the classical instance of occupational lung cancer in miners of nickel, cobalt and uranium ores in middle Europe. This particular hazard is of considerable interest to Australia at the present time, when uranium fields are about to be exploited.

Acknowledgements.

In paying tribute to my fellow worker, Miss C. McCall, B.Com., I should like to say that she deserves to be recognized as co-author of this paper, since without her help it could not have appeared in its present form. Preparation of the tables and drawing of the charts are her contributions, together with the careful mathematical computations involved. It is my pleasing duty to give her credit for this painstaking and skilful work.

Sources from whence we have obtained our data are given due acknowledgement in the appropriate places. We found Mr. G. E. Kitson, of the Victorian Government Statist Office, and Mr. L. W. Webster, of the Victorian Chest X-ray Survey, especially helpful in the collection of material. Over the years successive registrars at the metropolitan hospitals have been kind enough to render clinical abstract cards in the form required by the registry.

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A ROUTINE DESIGNED FOR THE EARLIER DIAGNOSIS OF CARCINOMA OF THE LUNG, WITH THE REPORT OF A SUCCESSFUL CASE.

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Because of the present unsatisfactory position in regard to the early diagnosis of carcinoma of the lung, it was thought that an organized attack should be made on the problem.

Two well-known but little used radiological procedures—namely, the taking of a postero-anterior X-ray film with the patient in complete expiration, and a tomographic examination of the bronchial tree—form the backbone of this routine.

Penington (1952) suggested that during the early stages of bronchogenic carcinomata a period of diminution of the lumen of the affected bronchus existed, and that during that stage these growths would cause a valvular closing of the bronchus during full expiration, so producing an area of segmental obstructive emphysema in the area of lung supplied by the obstructed bronchus. Therefore the taking of an expiration film could force the tumour to declare itself before it had progressed far enough to produce the usual lung catastrophes of atelectasis and collapse of a lobe with which we are all too familiar at present.

With this mechanism as a basis to work on, the routine was designed and put into action on September 2, 1954. Only five months' part-time work has been done on the subject to date, and the reason for such early publication is that Case 30 has proved the routine and the mechanism involved to be of practical value. This case, although not reaching the target point originally envisaged, yet fulfilled the requirements, and appears to be a signpost pointing to still better results in the future.

The Routine.

A rough yardstick has been devised for patients to qualify for submission to the routine. Any one or com-

bination of the following symptoms and signs suggestive of carcinoma of the lung is required to be present: (*a*) cough, (*b*) vague pain in the chest, (*c*) any degree of hæmoptysis, (*d*) localized "wheeze" in the chest, (*e*) localized emphysema, (*f*) any strange shadow in an ordinary postero-anterior X-ray film. Having qualified, the patient is then investigated along the following lines.

An ordinary postero-anterior film is taken in inspiration and also in complete expiration, and a cytological examination of the sputum is made. If both these investigations are regarded as giving normal results and the patient has not had an hæmoptysis, the result is considered to be negative. However, if the expiration film shows unilateral or lobular obstructive emphysema, especially if the mediastinum is pushed over to the opposite side and perhaps the diaphragm depressed, or if the cytological findings in the sputum suggest carcinoma, the next stage is proceeded with—a tomographic examination of the bronchial tree. This procedure fills in the very large step from the finding of an abnormality in the expiration film to a bronchoscopic examination. Tomography has been incorporated in the routine only since December 29, 1954. It has given us some very interesting and informative pictures, but with no positive findings to date. However, it has already proved its value by preventing several patients from being sent for an unnecessary bronchoscopic examination.

If the expiration film shows an area of segmental obstructive emphysema, as it did in Case 30, the taking of a unilateral bronchogram of the affected side is proceeded with. Bronchography should be reserved only for patients with definite indications, as the procedure entails some discomfort.

Finally, if any abnormality has been found in any of the preceding steps, or if the patient has had an hæmoptysis, he is sent for bronchoscopic examination. In my opinion the bronchoscope is unreliable in the early diagnosis of carcinoma of the lung, because the large majority of carcinomata occur beyond the reach of the instrument, and if an orifice of a stem bronchus is obstructed it usually means that the growth has tracked down from the site of the primary growth and is no longer in an early stage.

Results.

Up to date 700 patients have been "combed" to obtain 40 who qualified for the routine, and two proven cases of carcinoma have been found; in Case 15 an inoperable anaplastic carcinoma was found in the apical segment of the lower lobe of the left lung (proven by bronchial biopsy after the growth had tracked down to the orifice of the bronchus); and in Case 30, an operable comparatively early anaplastic carcinoma of the bronchus to the posterior segment of the upper lobe of the left lung was found.

Report of a Case.

A male patient, aged sixty-seven years, presented himself at the Chest Clinic on December 16, 1954, with a history of a cough with sputum for some years, and a vague pain in the left side of the chest, down the lateral aspect of the sternum and in the anterior triangle of the left side of the neck just above the clavicle. His daily ration of cigarettes was 20, but he had ceased smoking one year earlier. There were also several ordinary postero-anterior inspiration X-ray films dating from May to September, and the information that three smear examinations for tubercle bacilli made in May had all given negative results. Clinically he was extremely well, his weight being 13 stone. He was an active, robust man in full-time work as an executive, and still playing gentle golf. His chest was clinically clear; his heart was not enlarged and the sounds were regular and clear. His blood pressure was 145 millimetres of mercury, systolic, and 100 millimetres, diastolic. The inspiration films accompanying him showed a faint rounded shadow in the first left intercostal space about one centimetre in diameter, with a more defined "tail" running down towards the hilum of the lung.

The routine was commenced with the usual postero-anterior films taken in inspiration and full expiration, and a left lateral film. Cytological examination of sputum, examination of a smear and attempted culture of acid-fast bacilli, and a Mantoux test were all carried out. All these investigations were reported as giving negative results for malignant cells and tubercle bacilli—the culture is still in the incubator. The Mantoux test (old tuberculin, 1 in 1000) gave a strongly positive result. The inspiratory film fortunately showed no change in the lesion since May, except for perhaps a little thickening of the "tail". The left lateral film showed a small rounded mass in the posterior region of the upper lobe of the left lung. The expiration film showed a fan-shaped area of relatively increased translucency radiating out from the nodule to the periphery of the lung field, when compared with the corresponding area on the right side. In the inspiration film, no difference in density could be detected between the left and right side of the film in the suspected segment. The inference was that he was able to inhale air into this segment satisfactorily, but on expiration a valvular action was occurring in the bronchus, with trapping of air in the segment of lung supplied by this bronchus.

The next step was a bronchographic examination, and this showed a block in the bronchus to the apico-posterior segments. A film of the bronchogram was taken in full expiration for information, and this film showed two very interesting points: (*a*) that the segmental obstructive emphysema was occurring in the apical segment as well as in the posterior segment; (*b*) that there was considerable diminution in the calibre of the bronchi, which occurs in expiration during the normal breathing mechanism.

In view of the patient's age, symptoms, and negative sputum findings for acid-fast bacilli and radiological findings, it was thought that a carcinoma was present in the bronchus to the posterior segment of the upper lobe of the left lung, and the routine was regarded as giving a positive result.

This case was now presented to the surgeon, who agreed with the diagnosis and advised a thoracotomy as soon as possible. At operation on January 6, 1955, a bronchoscopic examination was performed prior to opening the chest, and no abnormality was seen—which again indicates the fallibility of this procedure as far as the early diagnosis of this condition is concerned. When the chest was opened a stony-hard mass was felt in the posterior segment of the upper lobe of the left lung. No glandular involvement of the mediastinum was found, and in view of this and the patient's age, segmental resection of the involved area was considered to be the operation of choice.

The pathologist's report was as follows: "The specimen was an anaplastic carcinoma with appearances of oat cells and associated basal cell appearances. The mass was stony hard and the tail was encompassing the bronchus, in which a small lumen could still be demonstrated."

The patient has done well, and time will tell whether we have been early enough.

Discussion.

The results so far obtained hold out hope for the earlier diagnosis of some of these tumours in the future and encourage further research along these lines.

In view of the narrowing of the bronchi in expiration, and of the fact that some carcinomata are present in the bronchi for much longer than we perhaps realize, expiratory films may give an indication of early partial bronchial obstruction. It is indeed possible that in this case the diagnosis could have been made by the routine months before the patient's symptoms appeared in May, 1954.

It is realized that bronchogenic carcinoma is not the sole cause of bronchial blocking with associated segmental obstructive emphysema; but a consideration of age, history and other findings in the routine should clear up the differential diagnosis.

The use of a film taken in full expiration is a cheap and effective procedure, and associated with the other steps in the routine gives us a method of boldly attacking this disease and opens up many interesting possibilities. For example, this might appeal to the mass survey radiologists, who in future, when asking for a large inspiration film, could in suitable cases couple it with an expiration film.

There are two absolute essentials for the successful prosecution of this routine: (*a*) one must be acutely "carcinoma-conscious"; (*b*) one must have considerable tenacity of purpose. Many disappointments will be experienced, but when a case is discovered, all the effort will have been well worth while.

Summary.

1. A routine has been designed to attempt the early diagnosis of carcinoma of the lung.

2. An early case of carcinoma of the lung diagnosed by this routine has been described.

3. Certain possibilities for the future use of X-ray films taken with the patient in full expiration have been suggested.

Acknowledgements.

My thanks are due to the Chairman of the Repatriation Commission for permission to publish this work. My thanks are also due to my colleagues in the Repatriation Chest Wing, without whose patient cooperation this result would not have been possible.

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REVIEW OF A CANCER DETECTION AND PREVENTION CLINIC.

By GRAHAM CRAWFORD,

Sydney.

DURING the past five years a cancer detection and prevention clinic has been conducted at the Royal Hospital for Women, Paddington. Over 4000 women have attended, and I think that this constitutes sufficient material for an estimate to be made of the value of the clinic.

Cancer detection clinics are popular in the United States of America, but not apparently in other countries. Our clinic was established with the object of comparing the incidence of cancer in apparently healthy Australian women with that in apparently healthy women in the United States of America.

In response to inquiries regarding the equipment and management of the clinic I give the following details.

Buildings and Equipment.

The clinic is conducted on one afternoon each week in the out-patient department, which is used at other times for ante-natal and gynæcological clinics. The equipment is that of a gynæcological out-patient department—namely, a trolly for each doctor, and a good spotlight in each cubicle. Each trolly has in addition to the usual instruments, swabsticks, slides and fixative for the taking of Papanicolaou smears.

Staff.

I conduct the clinic, usually with the assistance of three resident medical officers. At one period I had the services of two clinical assistants and one resident medical officer. This was a very satisfactory arrangement.

The nursing staff consists of seven trained members, one sister for history taking, four sisters in attendance on the medical officers, one sister for sterilizing instruments and one sister for urine testing.

The clerical staff consists of one clerk for appointments.

In addition to the services of the pathology department for routine hæmoglobin and Kline tests, a visiting pathologist examines the Papanicolaou smears.

X-ray facilities are present for whatever diagnostic examinations may be considered necessary.

The accompanying chart is filled in for each patient.

Conduct of Clinic.

First Visit.

At the first visit, each woman is interviewed by a sister, who notes on the chart the family history and a detailed personal history, including the reason for attending the clinic. Her weight is recorded, and a sample of urine is obtained and given a ward test for albumin and sugar, and the result is noted on the chart. A specimen of blood is taken for a hæmoglobin estimation and Kline test. Each woman then removes all her clothing and puts on a gown before entering an examination cubicle.

As will be seen from the chart, preceding examination "scout" questions are asked by the doctor to see if any suspicion is to be directed to parts other than the pelvis.

A general physical examination is made, followed by pelvic and vaginal examinations and the taking of a cervical smear. The latter is done with a cotton-wool tipped probe, which is applied to the cervix and endocervix; it is then rubbed on a slide marked with the patient's name and placed in fixative solution. At first the smears were made with a suction pipette applied to the vaginal vault; this method was abandoned in favour of the cervical swabbing, the smears being in the main technically more satisfactory.

If the examining doctor finds any abnormality, I examine the patient with him and the history is marked "Seen by H.M.O." and our findings are noted.

At the conclusion of the examination each woman is asked to attend in the late morning two weeks later.

"Repeat" Visits.

At "repeat" visits—that is, after three, six or twelve *months*—the patient's weight is recorded. A sample of urine is obtained and tested for albumin and sugar. The patient is questioned by the doctor concerning her health since her last visit with regard to her menses, bowels *et cetera*. The blood pressure is taken and an examination of the breasts, pelvis and vagina is made. Further investigations are made in accordance with the history and physical findings.

At the conclusion of the clinic I examine the history cards of all the women who attended the previous week, and which have now attached the pathological reports on the hæmoglobin estimation and Kline test and the cervical smear examination result.

Allocation.

After perusal of the history card a classification is made, in one of the following categories:

1. That no apparent abnormality exists. An appointment is made with the patient to return one year later.

2. That a pathological lesion is possible—for example, in the presence of loss of weight and such symptoms as irregular constipation or dyspepsia. In these cases appropriate investigations are arranged. If the woman has evidence arousing suspicion of ear, nose and throat, renal, cardiac or other lesions, she is referred to her own doctor or to a special clinic in another hospital for further investigation.

3. That a pathological lesion is present—for example, fibroid tumours, an ovarian tumour or cervicitis. In these cases the woman is told of the condition and asked to nominate where she wishes treatment to be carried out—by her own doctor or at this hospital.

4. The cervical smear findings are abnormal. (*a*) If there is clinical evidence of possible carcinoma, biopsy is advised forthwith. (*b*) If the cervix is clinically healthy, another smear examination is performed. If this also arouses suspicion, a diagnostic curettage and biopsy are recommended.

In accordance with the classification I mark the history card "N.A.D. 1 year", or "For X-ray chest", "Ba. enema" *et cetera*, or "Refer for Treatment" of certain conditions.

These women are seen by the senior sister the following week, and the recommendations made by me are conveyed

to the patient. Should I wish to examine a patient myself later that day, she is notified of the fact prior to coming in for her appointment.

It may be thought that some of these investigations could well have been arranged at the first visit; but experience has shown that the foregoing method is preferable.

CHART.

No.....

NAME Date M.S.W.
Address Age
Occupation Race
Family Physician Address
Family History of Cancer Mother Age
Father Age
Other Relatives

PAST HISTORY Childhood Diseases
Adult Diseases
Operations

SYMPTOMS

Lumps or Skin Lesions Blood in Sputum
Pain in Chest Persistent Cough
Persistent Hoarseness Persistent Headache
Persistent Discharge Ears Nose Throat
Dyspepsia Pain in Abdomen Jaundice
Constipation Diarrhœa Blood in Stool—Bright/Dark
Hæmaturia Dysuria Incontinence

PHYSICAL EXAMINATION Weight B.P.

1. *Eyes* Reaction to Light Accommodation
2. *E.N.T.* Mouth Tongue
3. *Neck* Thyroid Gland Lymph Glands
4. *Heart*
5. *Breasts* Pain Nursed Babies
Masses Discharge from Nipples
6. *Abdomen*
7. *Rectal Examination* (if indicated)
8. *Lungs*

GYNÆCOLOGICAL AND OBSTETRICAL

L.M.P. Cycle
Regularity Duration
Amount Slight Moderate Excessive
Intermenstrual Bleeding Discharge
Post-Menopausal Bleeding
Post-Coital Bleeding

CHILDREN No. Ages

MISCARRIAGES No.
Dates Duration of Gestation

PELVIC EXAMINATION

External Genitalia
Vagina
Cervix Distance from Introitus Direction
Size Consistency
Shape Ext. os
Erosion Discharge
Laceration
Uterus Position Consistency
Size Contour
Shape Sensitivity
Fornices

LAB. REPORTS
Kline Hb.
Urinalysis

REMARKS

Comment.

Approximately one year after the clinic commenced, inquiries became so numerous that appointments were made as far in advance as nine months. To eliminate the possibility of a woman with a lesion waiting for this length of time the following rule was made: the clerk, before giving an appointment, asks the woman if she is aware of any abnormality whatever. If the answer is in the affirmative, she is told to seek medical advice from her own doctor or to attend the gynæcological clinic if the symptoms warrant it.

From Table I it will be seen that 1146 women had some pathological lesion of which they were unaware: 1040 were referred for treatment, including 11 for carcinoma of the cervix and four for carcinoma of the breast.

The foregoing review is presented to aid those contemplating the establishment of a cancer detection and prevention clinic. As to its value or otherwise I would offer the following comments.

1. The work is tedious, and several hundred women may be examined without any "interesting" lesion presenting. This proves to be very irksome to resident medical officers, very few of whom have had any enthusiasm for the work. I consider that the medical staff of the clinic should be stable and comprise men of good general training and experience in preference to those whose approach is principally gynæcological.

2. Not all cancers will be detected. I have received reports of four women who have attended the clinic and have subsequently been treated for malignant lesions—one for carcinoma of the larynx, one for malignant disease of the caecum of indefinite pathology, one for carcinoma

of the breast, and one for carcinoma of the ovary. All these patients developed symptoms between annual repeat visits to the clinic. It should be emphasized that this period of one year is therefore too long if all carcinomata are to be detected. In the case of the breast cancer, the woman noticed a lump five months after her visit and immediately sought medical advice. A squamous carcinoma three centimetres in size was found at operation.

3. The size of the clinic should be limited, so that there should be no hesitation concerning the frequency of repeated visits. We have had at times to limit the number of smears taken because of saturation point reached by the pathology department in the preparation and examination of smears. At present our clinic has a waiting list of eleven months, and if we had had facilities our numbers would have been several times 4000.

4. I have not stressed the value of the cervical smear, and propose subsequently to discuss this and the microscopic findings in the 11 detected cases of cervical carcinomata.

TABLE I.

Results of Examination of 4000 Women, Subdivided into Age Groups for Purpose of Comparison.

Condition Found.	Age Group (Years).				
	20 to 35.	36 to 45.	46 to 55.	56 to 65.	66 to 80.
Carcinoma	1	4	3	2	1
Fibroid tumours	6	45	21	9	—
Cervical polypi	2	36	24	10	—
Cervicitis	128	241	77	8	—
Menorrhagia and metrorrhagia	6	16	9	1	—
Atrophic vaginitis	—	3	16	14	1
Vaginal cyst	1	2	2	—	—
Cystocele and rectocele	7	34	33	13	2
Urethrocele	1	4	1	—	—
"Leucoplakia" of the cervix	5	10	8	3	—
Pruritus vulvæ	—	1	2	2	—
Ovarian cyst	8	8	4	—	—
Salpingitis	2	2	—	—	—
Carcinoma of the breast	—	—	2	1	1
Mastitis	10	21	3	1	1
Fibroadenoma of the breast	—	6	—	—	—
Fibrocystic disease of the breast	—	—	5	—	—
Melanoma of the breast	1	—	—	—	—
Dyspepsia	4	4	5	2	—
Gastric ulcer	—	—	—	2	—
Abnormal gall-bladder	—	11	7	4	2
Duodenal ulcer	—	1	4	2	—
Chronic appendicitis	3	9	4	1	—
Diverticulitis	—	2	7	2	—
Duodenal diverticulitis	—	—	1	1	—
Colitis	—	1	1	—	—
Hæmorrhoids	6	16	11	6	2
Urinary conditions	—	6	6	3	—
Anæmia	7	38	26	4	2
Diabetes mellitus	—	3	1	3	2
Syphilis	1	1	—	1	2
Hypertension	5	40	58	46	9
Cardiac conditions	3	—	—	1	—
Thyroid conditions	2	5	2	1	—
Abnormal cervical smears	35	96	103	48	14
Normal cervical smears	516	1112	645	238	47

Conclusion.

I hope that the foregoing outline of the work of our clinic will help to answer the question whether a cancer detection and prevention clinic is of value: (*a*) Does the detection of 11 early carcinomata of the cervix and four carcinomata of the breast in 4000 women justify the effort entailed? (*b*) Are the non-malignant lesions detected of sufficient importance?

The detection and treatment, with the practical certainty of cure, of unsuspected carcinoma *in situ* with commencing invasion has been a profound emotional experience.

BROMIDE INTOXICATION.

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This communication does not present anything new, and makes no claim to do so. Its purpose is to remind the profession at large of the importance of bromide intoxication as a cause of psychosis, and to that end it presents a summary of present-day knowledge on the subject, together with some illustrative case histories. I feel that this reminder is required (i) because in the majority of cases of intoxication the drug has been obtained by the patient on the prescription of a doctor who was unaware of the risks he was taking in prescribing bromide, and (ii) because the correct diagnosis has often been missed in the past by psychiatrists, largely owing to forgetting the existence of this disorder. Perhaps the main reason for this lack of knowledge of such an important condition is the very inadequate space which is allocated to the discussion of the dangers of bromide medication in standard medical and psychiatric text-books. So little is known of the danger of bromide that it is a common story in our cases for patients with the early symptoms of bromide intoxication to be treated by the patient's doctor ordering the dose of bromide to be doubled, on the ground that it is becoming ineffective. I have treated quite a number of patients suffering from bromide intoxication now, and so far I have met with only one case in which the correct diagnosis was suspected by the patient's own doctor.

Bromides are among the most frequently prescribed of all drugs, and there is usually no anticipation of untoward results on the part of the prescriber. Most practitioners with whom I have discussed this subject are astonished to learn just how frequent bromide psychoses really are. Perhaps some figures will add point to my remarks. Routine serum bromide estimations were carried out on 100 consecutive patients admitted (or readmitted) to the female admission ward of Parramatta Mental Hospital in the period June to October, 1954. The serum bromide level was found to be raised in 19 cases. In seven cases a diagnosis of bromide intoxication was made, the source of the bromide being a doctor's prescription in six cases and a "consulting chemist" in one case. The importance of these figures is that they mean that 7% of all female patients admitted in the time mentioned were suffering from a psychosis which need not and should not have occurred. Bromide intoxication occurs less commonly among male patients admitted to mental hospitals than among females, but it still accounts for quite a number of cases. I am unable to offer any exact figures of its incidence among male admissions. The condition was diagnosed in six out of 230 consecutive male admissions to Parramatta Mental Hospital over a period of fifteen months. This represents an incidence of 2·6%. However, the true incidence is undoubtedly higher than this, because routine serum bromide estimations were not carried out in this group of male patients, and in these circumstances some cases will inevitably be missed.

There is nothing to suggest that the incidence of bromide intoxication in the period under survey is any higher than usual, nor is there any suggestion that more patients with bromide intoxication are admitted to Parramatta Mental Hospital than to other mental hospitals. I invite my readers to remember that Parramatta Mental Hospital is only one of a number of acute psychiatric hospitals in this State, all of which must receive their quota of admissions due to bromide intoxication. It will then be realized that bromide intoxications form an important group of psychotic admissions, all of which take up beds and require treatment and maintenance at the taxpayer's expense, and all of which could quite easily have been prevented. Only the severe cases of bromide intoxication reach mental hospitals, and the amount of chronic ill-health in the community due to bromide intoxications which have not reached psychotic proportions can only be guessed at.

Pharmacology.

A brief consideration of the pharmacology of bromides is essential to an understanding of how easily bromide intoxication can result from administration of this drug, and also to serve as a basis for the rational treatment of the established condition. It will be seen, too, how many long-held beliefs regarding the pharmacology of bromides have had to be revised in the light of recent investigations.

Absorption.

Inorganic bromides are readily soluble in water, and are rapidly absorbed into the blood-stream from the intestine.

Distribution.

After absorption bromide is distributed throughout the body in almost precisely the same way as chloride—that is, it is found in all the extracellular fluids and in the erythrocytes.

Most text-book accounts state that bromides do not penetrate cell membranes. Doubt has recently been cast on this belief by Brattgård and Lindqvist (1954), who studied the distribution of radioactive bromide ions. Their experiments show that, in the cat at least, bromides do occur in the cytoplasm and nucleus of nerve cells.

It is usually stated that the concentration of bromide in the erythrocytes is the same as in the plasma. Hunter, Smith and Taylor (1954) have shown that this is not an accurate statement, as the ratio of bromide in cell water to bromide in plasma water is 0·84. When blood is stored, the serum bromide tends to fall to a level corresponding to an even distribution of bromide throughout the blood water. When the estimation is carried out one to two days after collection of the blood, the serum bromide level is not likely to have dropped more than 2% to 3%, and the fall is of little significance when the result of a serum bromide test is being evaluated in a given patient.

Bromides are found in the cerebro-spinal fluid, but in a lower concentration than in the serum. In patients with normal meninges, the bromide distribution ratio between serum and lumbar cerebro-spinal fluid is 2·60, according to Hunter, Smith and Taylor. Within the cerebro-spinal fluid, the bromide concentration decreases on ascending the neural axis. The bromide concentration in ventricular cerebro-spinal fluid is about half that of lumbar fluid.

The most important point to be remembered about the distribution of bromide is that it replaces chloride. The total content of halides in the body remains quite constant. If bromide is administered, a corresponding quantity of halide (mostly chloride) is excreted, with the result that the total halide content is undisturbed.

Excretion.

Bromide, like chloride, is excreted mainly by the kidneys. Small quantities, however, are also excreted in the sweat, tears, saliva and gastric juice, and, in fact, in most of the secretions of the body. Those of my readers who recall the illustration of a severe bromide eruption in an infant in Molesworth's "Introduction to Dermatology" will remember that bromide is secreted in the milk. It should also be remembered that bromide crosses the placental barrier quite easily and replaces chloride in the fœtal body fluids.

Most text-books state that the kidney does not distinguish between bromide and chloride, and that the ratio of bromide to total halide is the same in the urine as in the blood. This state of affairs would tend to cause an accumulation of bromide in the body by itself. However, it is not a true account of what really does occur. Palmer and Clarke (1932) and Bodansky and Modell (1941) have shown that there is a preferential excretion of chloride by the kidney at the expense of bromide, and that this is an important factor in the accumulation of bromide in the body. Chloride and bromide are passed without any attempt at differential treatment into the glomerular filtrate, but bromide is reabsorbed much more quickly than chloride by the renal tubules. The result is that the proportion of bromide to total halide is less in the urine than in the blood. Bodansky and Modell further found that injection of mercurial diuretics caused a very large increase in the total halide excretion by the kidney, and also that the proportion of bromide to total halide in the urine so formed was increased considerably and approached the proportion found in the blood. One theory of the mode of action of mercurial diuretics is that they produce diuresis by reducing the rate of tubular reabsorption without affecting the rate of glomerular filtration. This theory adequately explains the value of mercurial diuretics in increasing the excretion of bromide.

We are now in a position to consider the fate of a small dose of bromide taken by mouth, having in mind the following two points which are so important that they will bear repetition. (i) The concentration of halide in the extracellular fluids and blood remains constant, irrespective of the amount ingested, and irrespective of what proportion of the total halide content is composed of bromide and chloride. (ii) There is a preferential excretion of chloride by the kidney at the expense of bromide, the bromide/total halide ratio being lower in the urine than in the blood.

After the ingestion of a small dose of bromide, the kidneys will excrete a quantity of halide equivalent to the quantity of bromide ingested, but the proportion of bromide in the excreted halide will be somewhat smaller than the proportion found in the serum and extracellular fluids—that is, only a very small proportion. Thus, even if no more bromide is administered, it will take several weeks for all the bromide to be excreted. If large doses of chloride are administered after the ingestion of bromide, the total output of halide will be increased considerably. Bromide will still be only a small proportion of the total halide excreted, but as a result of the increased total output the absolute quantities of bromide excreted will be increased, and bromide will be completely eliminated from the body more quickly.

If repeated doses of bromide are given, the bromide ion accumulates in the blood and extracellular fluids until a state of equilibrium is finally attained, in which the kidneys excrete approximately as much bromide per day as is ingested. If the chloride intake is low, bromide accumulates rapidly; whereas with a high chloride intake the accumulation of bromide is much slower. The fluid intake is also a very important determining factor in the accumulation of bromide; a low fluid intake hastens accumulation, and a high intake retards it. So important are these factors that Barbour, Pilkington and Sargant (1936) remark: "Prescribing bromides without knowing the chloride-fluid intake is tantamount to prescribing an indefinite quantity of bromide."

Mode of Action.

The action of bromide is to produce depression of the central nervous system. This specific action is produced solely by the bromide ion and not by bromine in other forms, such as bromates or organic compounds. It can thus be seen how irrational is the practice of prescribing such mixtures as triple bromides (a mixture of sodium, potassium and ammonium bromides) in an attempt to avoid bromide intoxication. Such a mixture depends for its action solely on the bromide ion present, and is just as likely to lead to intoxication as potassium or sodium bromide used alone.

The bromide ion brings about its depressing effect in the nervous system by acting directly on the nerve cell. The exact mechanism of this action has been unknown, but in a recent paper Harris and Derian (1949) put forward some very interesting hypotheses. Their theories and subsequent experimental work were founded on a similarity (perhaps a little far-fetched) that they claimed to have noticed between the symptoms of pellagra and those of bromide intoxication. Pellagra, as is well known, is due to deficiency of nicotinic acid, this vitamin being necessary for the formation in the body of coenzymes I and II, which play an essential part in tissue respiration. As a working hypothesis, these authors assumed the destruction or faulty synthesis of these enzymes as the result of an increased bromide level in the blood and tissue fluids.

An experimental study demonstrated the existence of increased urinary excretion of porphyrins in dogs deficient in nicotinic acid, and also in dogs maintained at a blood bromide level of 300 milligrammes per 100 millilitres. The complete absence of toxic manifestations in a third group of dogs with a serum bromide level of 300 milligrammes per 100 millilitres, but on a diet supplemented with nicotinic acid, seemed also to bear out the authors' hypothesis. Six cases of bromide intoxication in humans were studied by the authors. In these cases the coproporphyrin excretion was found to be increased above normal levels. Two of the patients were treated with niacinamide, 600–750 milligrammes per day, in conjunction with sodium chloride therapy, and the remaining four patients were given niacinamide only, while maintaining a relatively high serum bromide level. In both groups, clearance of symptoms was rapid, with an average time of five days. One patient was completely free of symptoms with a serum bromide level of 275 milligrammes per 100 millilitres after six days of niacinamide administration.

All these observations tend to support the authors' theory that bromides produce their action by interfering with the formation of coenzymes I and II, and that this action can be abolished by the administration of massive doses of nicotinic acid, although I feel that none of the evidence presented is really conclusive. It is certainly an attractive theory, and I think that further investigation of it is desirable. It is of more than passing interest to note that a recent paper by Gould (1953) reports that states of delirium and coma due to barbiturates and several other narcotic drugs, such as "Omnopon", heroin and pethidine, respond rapidly to massive doses of *B*-group vitamins, ascorbic acid and glucose. It thus appears likely that bromides and a number of other narcotic drugs may act in a similar manner by interfering with those aspects of tissue respiration which require the presence of one or other of the vitamins for their successful completion.

Clinical Features.

This communication deals only with bromide psychoses and other psychiatric aspects of bromism. It is not concerned with dermatological manifestations of bromide intoxications. Bromide intoxication may be defined as a state of disordered mental and physical functioning in which there are (i) a raised serum bromide level and (ii) recovery when bromides are eliminated from the body. It will be noted that no specific figure for the serum bromide level is mentioned. There is no "toxic threshold" for bromides, as will be seen later.

Acute bromide intoxication is said not to occur, as it is not possible to take a single poisonous dose of bromide without producing vomiting. Consequently the term bromide intoxication always means chronic bromide intoxication.

Mental Symptoms.

In the mildest cases of bromide intoxication there are dulness, lethargy, fatigue, difficulty in concentration, complaints of headache, anorexia *et cetera*. There is nothing specific about these symptoms which could cause the doctor to suspect their relationship with his patient's bromide mixture, unless he is more aware of the dangers of bromide medication than many members of the profession. It should, however, be possible for the majority of cases to be recognized for what they are, at this early stage, and appropriate adjustments made in the patient's medication. In this way the majority of severe intoxications could be avoided. Of course, the odd case would still occur in patients who take this drug without medical supervision, but the present position is that most cases of bromide intoxication occur in patients who are under the care and supervision of their own doctors. Perusal of the literature reveals that this latter statement is true not only of Australia, but also of England and the United States.

When the intoxication becomes more severe, the disturbance in mental functioning reaches psychotic proportions. The psychosis takes the form of a toxic delirium, the principal features of which are disorientation, restlessness and hallucinations, the degree of prominence of each of these symptoms varying from patient to patient, and even in the same patient from time to time. Some patients lie quietly in bed plucking aimlessly at the bedclothes, and preoccupied with their hallucinations and delusions, while others are restless, noisy and resentful. All, however, show disorientation of greater or less degree, and disturbances of recent memory. In many cases the hallucinations are present only at night, but in more severe cases they occur by day as well. One of the characteristics of the psychosis is its tendency to show marked fluctuations in severity. A patient may be able to converse comparatively rationally on one occasion, but an hour later he may be restless, noisy and hallucinated. The hallucinations and delusions vary—from being quite unsystematized and fantastic in some cases to being fairly coherent in others, with perhaps some obvious relationship to the patient's current problems and his life experiences. In other words, the hallucinations and delusions are produced by the presence of bromide in toxic quantities, but their actual content is psychologically determined. As Diethelm (1930) puts it: "It is always the whole psychobiologically integrated personality which reacts." Levin (1933) claims that another bromide psychosis, in addition to the typical delirious reaction, occurs. He calls this condition bromide hallucinosis, and states that it is characterized by hallucinations with the patient remaining correctly orientated. He states that bromide hallucinosis is much less common than bromide delirium. There is considerable doubt whether bromide hallucinosis really exists as an entity. I personally have never seen a convincing case.

When bromide intoxication becomes very severe, clouding of consciousness becomes a notable feature, so that the patient may be very drowsy, stuporose or even fully comatose. When the patient is still capable of speaking, his speech is usually very confused and often quite incoherent. In these very severe cases, incontinence of urine and fæces often occurs. These patients cannot help themselves in any way, and very careful nursing is required.

Neurological Symptoms.

The commonest neurological manifestations are slurred speech, ataxia and tremor, either of the hands alone or generalized. A fairly common story told by patients' relatives is that the patient staggers when walking "as if he were drunk". Often this occurs for periods of several days, separated by intervals of several days when his gait is normal, the changing clinical picture being due to fluctuations in the intensity of the intoxication.

Less commonly occurring neurological signs are changes in the deep and superficial reflexes, and changes in the pupillary reflexes of the eyes. Almost all possible disturbances of these reflexes have been reported as having been observed associated with bromide intoxication. A characteristic feature of these disturbances is their marked variability from day to day in the same patient. Perkins (1950) states that the occurrence of haphazardly changing reflexes should suggest the possibility of bromide intoxication.

Other Physical Manifestations.

Dry skin, furred tongue and other signs of dehydration are fairly common in the more severe cases.

Skin rashes, which, unlike bromide psychoses, are fairly widely recognized as a risk of bromide medication, are not often seen in cases of bromide psychosis, so that the presence or absence of a rash is of no assistance at all in the diagnosis of a suspected case. I have never seen a bromide rash in a case of bromide psychosis, although one of my patients told me after recovery from her psychosis that she had suffered from a rash diagnosed as being due to bromide some months before the psychosis began to develop.

Special Investigations.

Bromides are found in the cerebro-spinal fluid in all cases of bromide intoxication, but in a lower concentration than in the blood, as was mentioned earlier. An interesting finding reported in several papers (Perkins, 1950; Greenblatt, Levin and Schegloff, 1945) is a rise in the

total protein of the cerebro-spinal fluid to levels above 45 milligrammes per 100 millilitres in some cases. The total protein level returns to normal concurrently with the reduction of bromide in the blood and body fluids to normal levels. I am not able to offer any comment on, or add any facts to, these statements, as lumbar puncture and examination of the cerebro-spinal fluid were carried out in only a few of my cases. I feel that the information to be obtained by cerebro-spinal fluid investigations in an ordinary case of bromide intoxication is not of sufficient value to warrant their being carried out as a routine.

Greenblatt, Levin and Schegloff (1945) carried out electroencephalographic studies in a series of cases of bromide intoxication. They report that 19% of patients with serum bromide levels of under 100 milligrammes per 100 millilitres had electroencephalographic abnormalities, while 88% of patients with serum bromide levels of over 200 milligrammes per 100 millilitres had electroencephalographic abnormalities. At high serum bromide levels the electroencephalogram showed mainly diffuse slow activity, most commonly in the five to eight cycles per second range. In the intermediate ranges of serum bromide concentration the electroencephalogram showed faster waves than normal mixed with the slow component, while at low serum bromide levels the electroencephalogram usually exhibited abnormally fast activity. However, the authors stress the fact that there is no actual correlation between electroencephalographic abnormality and serum bromide level in individual cases. Patients with the same serum bromide levels may quite easily have entirely different electroencephalograms.

Katzenelbogen, Goldsmith and White (1933) state, quite accurately, that "in the diagnosis of bromide intoxication the determination of bromide in blood reveals the most significant fact, if not the only pathognomonic symptom". Bromide psychoses cannot be differentiated with certainty by clinical means alone from other toxic confusional psychoses, or even in some cases from non-organic psychoses such as schizophrenia. I can state from my own experience that, no matter how alert one is to the possibilities of bromide intoxication when considering a diagnosis, cases will be missed if a routine serum bromide estimation is not carried out on all patients admitted. Consequently routine serum bromide estimation on all psychiatric patients admitted is highly desirable. It is a fairly simple procedure and can be carried out in any well-equipped laboratory. All that is required on the part of the doctor is to collect the blood and send it without any special preparation in a sterile bottle to the laboratory. If 10 millilitres of blood are sent, sufficient serum is available for carrying out serum bromide estimation, Wasserman test and Kahn test, the latter two tests being at present, and for many years past, part of the routine investigation of all newly admitted patients to mental hospitals. Levin (1952) points out that not only does a routine serum bromide estimation make for better diagnosis, but in addition "it would make for better treatment, in so far as it would tend to avert the use of shock treatment in cases that don't need it". Many cases of bromide intoxication have undoubtedly, in the past, been treated with electroconvulsive therapy with eventual recovery, not however due to the electroconvulsive therapy, but to the passage of time and the excretion of bromide from the body.

Unfortunately, there is no exact correlation between the serum bromide level and the toxic effects produced by the drug. A raised serum bromide level is not, therefore, by itself indicative of bromide intoxication. The serum bromide level must be regarded as only part of the total clinical picture, due consideration being given to the results of the physical and mental examination, the personal history and the pre-psychotic personality. The following facts can, however, be regarded as a reliable basis for the interpretation of a serum bromide estimation. (i) The normal serum bromide level is 0·5 to 2·0 milligrammes per 100 millilitres. (ii) The therapeutic level (as, for example, in a case of epilepsy) is approximately 75 to 125 milligrammes per 100 millilitres. (iii) Levels of 100 to 200 milligrammes per 100 millilitres are unlikely to produce symptoms in physically and mentally healthy adults, but are likely to produce signs of intoxication in certain susceptible individuals. (iv) Serum bromide levels of 200 milligrammes per 100 millilitres or over produce symptoms and signs of intoxication in the great majority of cases, although a few cases have been reported in the literature of patients who remained symptom-free with levels of over 200 milligrammes per 100 millilitres.

The matter of individual susceptibility is of the greatest importance. It is fairly widely recognized that susceptibility to bromide intoxication is considerably increased by certain physical causes—advanced age, cachexia, arteriosclerosis, impaired renal function and chronic alcoholism. It is not so widely recognized that, apart altogether from these physical disorders, there is a great individual variation in susceptibility to bromide intoxication. This "constitutional factor" (for want of a better name) is not well understood. Barbour (1936) points out that just as some people can "carry" their alcohol without becoming intoxicated, so some patients can take bromides without ill-effects, while others cannot. Some idea of the extent of this individual variation is given by the results of some experiments carried out by Katzenelbogen, Goldsmith and White (1933). They subjected 30 patients to intensive bromide treatment in order to study the correlation between clinical and laboratory findings. They found that certain patients developed quite definite evidence of bromide intoxication with serum bromide levels of 120 and 147 milligrammes per 100 millilitres, while there were cases in which serum bromide concentrations of 315 and 385 milligrammes per 100 millilitres were not accompanied by clinical symptoms or signs. Wagner and Bunbury (1930) reported a series of 15 patients with bromide intoxication (proved by their improvement after elimination of bromide) with serum bromide levels between 75 and 125 milligrammes per 100 millilitres. The great majority of these patients were suffering from psychoses of various types, to which a bromide psychosis had become superadded. Goodman and Gilman (1941) state that "in any patient in whom unexplained mental or neurological symptoms exist coincident with a blood bromide value of 75 to 100 mg. per cent, the bromides must be held in high suspicion as the main or contributory cause of the syndrome until they are proved blameless". Campbell (1949) considers that it should not be a question of how much bromide is necessary in the system to produce a psychosis, but how little is required in some circumstances to cloud the sensorium and increase the nervous symptoms of the patient.

It must be obvious that anyone who takes sufficient bromide to become intoxicated cannot be normal. Consequently some thought must be given to the underlying illness which caused the patient to take bromide, and this must be studied when the manifestations of intoxication have disappeared. Some patients will be found to suffer from an illness which requires treatment or care as an in-patient—for example, depressive psychoses, schizophrenia and cerebral arteriosclerosis. The majority suffer from less severe disturbances, such as anxiety states, chronic alcoholism and hysteria. Chronic anxiety states form the largest single group. These patients can usually be discharged from hospital as soon as the bromides have been eliminated from the body, although they usually require psychiatric assistance on an out-patient basis, or from their own doctors.

Treatment.

The first step in treatment obviously is to discontinue bromide medication at once. It should also be remembered that the best treatment of mild confusion and restlessness in a patient taking bromide is not to double the dose of bromide, as is so often done.

Specific treatment of the condition consists of the administration of large doses of chloride, which results in increased excretion of halides and, consequently, of bromides. The standard method has been to give eight to 12 grammes of sodium chloride daily by mouth in tablet form. At the same time large quantities of fluid (four litres daily) are given.

This treatment results in steady improvement in the patient's mental condition concurrent with the elimination of bromide. However, it may take three to four weeks before mental symptoms and signs disappear, and this has led to efforts to find a more rapid method of eliminating bromides. It was mentioned previously that certain diuretics increased the total excretion of halides and, at the same time, increased the proportion of bromide in the halide excreted. Cornbleet (1951) suggested the use of ammonium chloride in treatment, because as well as providing chloride it has a mildly diuretic action. He recommended doses of five to eight grammes daily, together with large quantities of fluid, and pointed out that this treatment should be given only when kidney function was normal. This method has been my routine treatment in cases of bromide intoxication for some time, and it works satisfactorily.

It can be given in the following prescription:

℞.

Ammonium chloride, 30 grains;
Syrup of orange, 30 minims;
Water, to half an ounce.

Half an ounce to be taken three times daily after meals and at 8 p.m.

Four doses per day of this mixture provide eight grammes of ammonium chloride. The mixture has an unpleasant taste, but this is not a great disadvantage. In severe cases of intoxication (semicomatose or comatose subjects), the patient may not be able to take chloride or fluids by mouth. In these cases, tube-feeding and subcutaneous infusion (with hyaluronidase) of 0·9% saline solution may be required to provide chloride, fluid and nourishment for a few days until the patient can take these by mouth. In some severe cases the patients are quite restless, and paraldehyde in doses of two drachms is the sedative of choice.

These treatments could be easily carried out in any general hospital, and certification and detention in mental hospital thus avoided for all except the few really restless and noisy patients. This, of course, involves the making of a correct diagnosis before consigning the patient to the Reception House.

Other methods of treatment have been recommended, and are mentioned as they may prove useful in certain cases.

Hussar and Holley (1952) recommended the use of sodium chloride, together with mercurial diuretics. I have not used this method as a routine, although it has a sound theoretical and experimental basis, being based on the work of Palmer and Clarke (1932) and Bodansky and Modell (1941) mentioned previously.

Tillim (1952) comments favourably on the use of insulin in subcoma doses. This frequently produces a profuse diaphoresis, with a resultant increase in the quantity of bromide lost by the body in the sweat. In any case, the treatment has a beneficial effect on the food intake, the appetite often being very poor in cases of bromide intoxication. I have not used this method, but feel that it could be useful in certain cases.

Harris and Derian (1949) recommend the use of large doses of nicotinic acid, for reasons already given. They use a total of 600 to 750 milligrammes per day divided into three to five doses. Their paper only recently came to my notice, and I have been able to try the method only in one case. This patient lost all signs of intoxication in four days after commencing this treatment, but whether the recovery was *post hoc* or *propter hoc* I do not know. I think that more extensive trials are needed before any really reliable opinions can be given on the value of this treatment.

Prevention.

In view of the number of acute admissions of patients to mental hospitals due to bromide intoxication, I feel that the prevention of bromide intoxication is a worthy aim, which if attained would result in the saving of much unnecessary distress to patients and relatives, and also a considerable saving in the expenditure of taxpayers' money. In theory, this should be quite easy, but in practice it has not worked out so far. Sippe and Bostock warned of the dangers of bromide medication in THE MEDICAL JOURNAL OF AUSTRALIA as long ago as 1932, but cases are still of frequent occurrence. The Council on Pharmacy and Chemistry of the American Medical Association published a warning regarding the hazards of bromism in *The Journal of the American Medical Association* in 1940, but, if we may judge by reports in the literature, bromide intoxication still forms quite a problem in the United States.

The prevention of bromide intoxication among chronic psychotics detained on a long-term basis in mental hospitals should be easier of attainment. That bromide intoxication does occur from time to time in these patients was demonstrated a few years ago by Dr. J. N. Main, who collected a series of cases in a refractory ward of a large metropolitan mental hospital. Many of these patients do require heavy sedation, but it should be possible to select the sedative in such a way that control of restlessness and aggression is obtained without making the patient's mental condition worse. (Incidentally, I am greatly indebted to Dr. Main, who first impressed on me the importance of bromism as a cause of psychosis.)

As there appears to be no therapeutic action of bromide which cannot be obtained equally as well or better with other drugs, I think that a strong case can be made out for a total ban on the medicinal use of bromide. If, however, bromide must be used, it should be used only under the direct supervision of the physician, with the assistance of regular serum bromide estimations. The doctor's prescription should state clearly how many times and at what intervals the medicine is to be repeated; and if it is not to be repeated, the prescription should clearly say so. It is not safe to prescribe bromides in any other way.

It is of common occurrence for a patient to have a prescription for bromides repeated frequently over a long period without the doctor's authorization. Furthermore, bromide mixtures, proprietary "nerve tonics" and sedative tablets containing bromide can be purchased over the counter from any chemist without a prescription. The latest horror on the market is an antacid powder which contains 10 grains of a bromide per dose of one drachm. This state of affairs should be permitted no longer. It would be to the public benefit for bromides to be covered by the Dangerous Drugs Regulations.

Illustrative Case Reports.

CASE I.—Mr. A, aged sixty years, was suffering from carcinoma of the prostate, with metastases involving the *cauda equina* and causing early signs of paraplegia. He could walk, but with great difficulty.

The history was that he had been a patient in a hospital dealing with chronic diseases for a period of five weeks, after which he became rather unsettled and was taken home. He was examined by his local doctor, who found him to be confused, and who had him admitted to a private nursing home. He was confused all the time he was at the nursing home, and restless and noisy at night. After a week there he was transferred to the Reception House, Darlinghurst, where he was certified and sent to Parramatta Mental Hospital. On admission to this hospital he was found to be mildly confused, but cooperative and capable of coherent conversation. His memory for recent events was very faulty, and he was disorientated for time and place. He stated that he had been badly treated at the first hospital mentioned, and gave as an example the fact that the sister in charge of his ward at night gave all the patients in the ward a needle to put them to sleep, so that she could spend the night out on the river in a prawning launch. After he had spent some weeks at the hospital an ambulance had called and taken him to Central Railway Station, where he was put on the train to Tamworth so that he could be "X-rayed" there. He stated that Tamworth was 700 miles distant from Sydney, but he made the trip there and back in seven hours. On his return he was put through a lie-detector test in the ambulance. He was then taken to his brother's house in an inner suburb, and was kept there in an upstairs room for several days, during which time several people gave him needles. He had no idea who the

people were or why he was being subjected to this treatment. While in this room he was made to drink his own urine and he thought that this might have been a test that he was being put through by two specialists who were treating him. After several days of this he was sent to the Reception House. Eight days after his admission to Parramatta Mental Hospital his serum bromide level was found to be 113 milligrammes per 100 millilitres. He was quite well mentally three weeks after his admission to the hospital, and was discharged to the care of his relatives six weeks after admission.

CASE II.—Mr. B, aged thirty years, was in a chronic schizophrenic residual state and had been under care at Parramatta Mental Hospital for one year and eight months. He was allowed on leave in his parents' care and remained at home for twelve months. His mother stated that he was quite well-behaved at first, but had no energy and could not work. After being at home for about two months he began to have difficulty in sleeping and would get up and wander about the house at night. The family did nothing about it for a further month; and then, as the trouble had not settled down, he was taken to his local doctor, who prescribed a "nerve tonic", to be taken twice daily. This produced some benefit for a time, but then "he seemed to get used to it". The doctor then said that if one dose did not settle the patient it could be repeated. Nine months after returning home the patient was noticed to be "staggery in the legs", as if he was drunk. This "staggery" condition would last a few days, disappear for a few days, then recur, and so on. The patient's appetite was also noticed to disappear and return. He did not improve, and eleven months after going home additional sedation (exact nature unknown) was prescribed. He was returned to hospital twelve months after going home, his mother stating that for the previous few days he had wanted to lie down and sleep all day. On his return to hospital he was quite emaciated and stuporose. He was restless in an aimless fashion, lying in bed and picking at the bedclothes. He was quite inaccessible mentally, completely unaware of his environment, and muttered incoherently to himself. He was incontinent of urine and fæces. He was totally unable to help himself in any way and could not even take nourishment when an attempt was made to spoon-feed him. He was tube-fed twice daily, until he was able to take food from a spoon after four days. A serum bromide estimation four days after his return to hospital revealed 224 milligrammes of bromide per 100 millilitres. He was given chlorides and large quantities of fluid, and made steady progress. It took four weeks before signs of intoxication disappeared completely, and eight weeks before the serum bromide level returned to normal.

CASE III.—Mr. C, aged eighty-three years, had arteriosclerosis and suffered from repeated attacks of *angina pectoris*. He had had one coronary occlusion. He had been well mentally until a few weeks prior to his certification and admission to Parramatta Mental Hospital. His family noticed that, a few weeks after his doctor put him on a new medicine, "his mind seemed to become wandery". His conversation became rambling and confused, and he became restless. Later he developed hallucinations, and at about the same time became incontinent. He was sent to the Reception House, where he was at first confused, restless and noisy, and was admitted to Parramatta Mental Hospital as a certified patient four days later. By the time he reached Parramatta his psychotic episode was already starting to subside. He was quiet and cooperative, and conversed normally. He was correctly orientated for time but not for place. His recent memory was defective. He could not recollect being treated by his local doctor, nor could he remember having been taken to the Reception House. He gave an account of a very confused collection of hallucinations and delusions which he had experienced in the previous few days—being kidnapped by Japanese, being mixed up with some organization selling women's underwear, seeing a large crowd of women standing about in their underwear, and so on. He was no longer experiencing hallucinations and delusions, and had full insight into their nature. A serum bromide estimation performed ten days after his admission to Parramatta Mental Hospital revealed 110 milligrammes of bromide per 100 millilitres. He made a rapid recovery and was found to be an alert and cheerful old gentleman, with his mental faculties in a remarkably good state of preservation for a man of his age and physical infirmities.

CASE IV.—Mrs. D, aged forty years, was in good physical health, apart from a history of several attacks of pyelitis, but suffered from a chronic anxiety state. She had been separated from her husband for eight years and divorced for three years. She had a steady "boy friend", of whom she was very fond; and although he had been promising marriage for eight years he always became most evasive when she tried to get him to fix a definite date for the ceremony. For some months she had been taking "nerve medicines" prescribed by a "consulting chemist", and prior to that had consulted numerous doctors. She became very confused and this led to a local doctor being called, who sent her to the Reception House by ambulance. On admission to Parramatta Mental Hospital she was depressed, tearful and apprehensive. There were mild disorientation for time and place, and obvious defects in recent memory. She had nocturnal hallucinations, both visual and auditory. She saw faces at the window at night, the face she saw most frequently being that of a man who had tried to force his way into her house a year or so previously. She frequently heard voices, which made nasty remarks about her boy friend, such as "Wake up to yourself—he'll never marry you" and "You'll have to drop him". The patient also stated that her son and her neighbours told her that she had been wandering about the streets at night in her nightdress and keeping knives under her pillow, although she had no recollection of doing either of these things. She complained that she often staggered as though drunk when walking, and that "my head swims all the time". She attempted to write a letter to her "boy friend" on the day after admission to hospital, but found that after she started a sentence she could not remember how she had intended to end it. Serum bromide estimation revealed a bromide level of 216 milligrammes per 100 millilitres. No attempt was made at the outset to reduce the bromide level, but the patient was given nicotinic acid in doses of 200 milligrammes four times daily. She made a complete recovery from her psychosis in four days and said that she had not felt so clear mentally for about two years. She was found to be a bright, alert little person, but very tense and anxious. Whether this dramatic recovery would have occurred without nicotinic acid is hard to say with certainty. I feel, however, that in view of her severe intoxication the recovery was more rapid than one was entitled to expect, and that further trials of nicotinic acid therapy are indicated. Following the above treatment measures to reduce the bromide level were instituted and the serum bromide level fell to normal levels three and a half weeks after she entered hospital. The patient left hospital under her own care. She has been seen several times since going home, and is still tense and anxious, and still having difficulty in getting her "boy friend" to name a definite date for their wedding. She suffers from insomnia and requires a short-acting barbiturate to help her to sleep. In spite of her neurosis she is able to look after her household efficiently and to cope fairly adequately with day-to-day problems, now that her mind is not clouded by bromide.

This case is an excellent illustration of my previous remarks regarding the psychological determination of the content of the hallucinations and delusions of the bromide psychosis.

CASE V.—Mrs. E, aged forty years, was well physically apart from lumbar spondylitis. She suffered from a long-standing anxiety state. There was considerable antagonism between the patient and her father, and she could not get on with her husband's employer. She was a very sensitive person, quick to take offence when this was not intended, and inclined to ponder on her grievances for an undue length of time. She had had a psychotic episode approximately seven months before her admission to Parramatta Mental Hospital. This psychosis was characterized by depression and delusional ideas. She was admitted to a private hospital and given electro-convulsive therapy, and was stated to have made a superficial recovery. She had a further psychotic episode which began one month before her admission to Parramatta Mental Hospital. In this attack she became restless and developed what was described as catatonic excitement with posturing. She was again admitted to a private hospital (under a different psychiatrist) and given electro-convulsive therapy. She had short lucid intervals, but there was no real improvement after an adequate course of electro-convulsive therapy. She was therefore sent to the Reception House, certified and admitted to Parramatta Mental Hospital. On arrival at the hospital she was agitated, apprehensive and depressed. She was disorientated for time and place, and believed that she was in "an asylum at Maitland". There was obvious impairment of recent memory. She was hallucinated and had unsystematized persecutory delusions and ideas of reference. She said that she could hear her children talking to her, that people were piercing her body with electric needles, and that people were talking about herself and her husband and accusing them both of immorality and marital infidelity. In view of her presenting symptoms and signs and her history a diagnosis of schizophrenia was made, the disorientation and impairment of memory being attributed to the fairly intensive course of electro-convulsive therapy which she had received in the private hospital prior to her admission to Parramatta Mental Hospital. Fortunately, the correct diagnosis was revealed

when a routine serum bromide estimation a few days after admission disclosed a bromide level of 173 milligrammes per 100 millilitres. Measures to lower the serum bromide level were instituted and resulted in a complete recovery, the patient, of course, being left with her chronic anxiety state. After recovery the patient revealed that she had been taking sleeping draughts on and off for ten years. For the eighteen months prior to her certification she had been taking a bromide mixture by day, with instructions from her doctor that if she felt more than usually tense and anxious at any time she should take an additional dose of the mixture. The patient went home five weeks after her admission to Parramatta Mental Hospital. Her husband said he felt that the patient was far better physically and mentally on discharge from hospital than she had been for well over a year.

There can be little doubt in view of these facts that the patient's first psychotic episode was a bromide psychosis like the second one. Recovery then was due, not to the electroconvulsive therapy which was given, but to the cessation of bromide medication while in hospital. This case illustrates the diagnostic and therapeutic pitfalls into which it is easy to stumble if a routine serum bromide estimation is not carried out on all psychotics on admission to hospital.

CASE VI.—Mrs. F, aged forty-six years, had gross spinal deformities and wasting of the left upper and lower limbs due to poliomyelitis many years previously. She suffered from a chronic anxiety state and had also been a heavy drinker for about twelve years. She had taken "nerve medicines" from doctors and chemists for two or three years. She first showed signs of psychosis about a week before her admission to Parramatta Mental Hospital as a certified patient from the Reception House, Darlinghurst. On admission she was grossly confused, restless and incontinent of urine and fæces, with severe impairment of recent memory and complete disorientation for time and place. She was acutely hallucinated and had very prominent persecutory delusions, which roused strong resentment. The delusions were not systematized and changed frequently, but always involved some form of persecution. She claimed that she could hear her husband talking outside the door of her room, that there were red-hot balls in her bed, that the electric light in her room was torturing her, that there were electric wires in all the blankets and sheets, and so on. She resisted all nursing attention and refused to take nourishment. She was so ataxic that she could not walk, and there was a marked degree of dysarthria. Serum bromide estimation revealed a bromide level of 300 milligrammes per 100 millilitres. Treatment was difficult, because the patient was refusing all attempts to give fluids or food by mouth; and a week after her admission to hospital the serum bromide level had fallen only to 244 milligrammes per 100 millilitres and her clinical condition was quite unchanged. She was still restless, resentful, resistive, incontinent, hallucinated and delusional. At this stage she was given a subcutaneous infusion (with hyaluronidase) over a period of twenty-four hours of four litres of 5% dextrose in physiological saline (that is, nine grammes of sodium chloride per litre). "Mersalyl", two millilitres, was given intramuscularly at the beginning of the infusion and again at its conclusion. This resulted in a fall of the serum bromide level from 244 milligrammes to 169 milligrammes per 100 millilitres in the twenty-four hours taken by the infusion. At the end of the infusion the patient was still confused and retained her delusions and hallucinations, but was now quite cooperative, took food, fluids and medication well, and was no longer incontinent. From this time on the patient made rapid progress and had lost all signs of psychosis two weeks after her admission to hospital. The serum bromide level fell to normal in four weeks after admission and the patient was then allowed to go home.

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Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Multiple Sclerosis", by Douglas McAlpine, M.D., F.R.C.P., Nigel D. Compston, M.A., M.D. (Cantab.), M.R.C.P., and Charles E. Lumsden, M.D. (Aberd.); 1955. Edinburgh and London: E. and S. Livingstone, Limited. 9¼" x 6¼", pp. 312, with 32 illustrations. Price: 25s.

Based on 1072 cases of multiple sclerosis seen at the Middlesex Hospital.

"Practical Obstetric Problems", by Ian Donald, M.B.E., M.D. (London), B.A. (Cape Town), M.R.C.S. (England), L.R.C.P. (London), M.R.C.O.G.; 1955. London: Lloyd-Luke (Medical Books), Limited. 8¼" x 6", pp. 590, with 29 illustrations. Price: 45s.

The book consists of 29 chapters each of which deals with a special problem.

"Paediatrics for the Practitioner", edited by Wilfrid Gaisford, M.D., M.Sc., F.R.C.P., and Reginald Lightwood, M.D., F.R.C.P., D.P.H.; 1954. London: Butterworth and Company (Publishers), Limited. Sydney: Butterworth and Company (Australia), Limited. Volume II. 10" x 7", pp. 574, with 83 illustrations. Price: £17 10s. for set of four volumes.

There are 18 contributors to this volume, the text being divided into nine parts.

"Diseases of the Nervous System: Described for Practitioners and Students", by F. M. R. Walshe, M.D., D.Sc. F.R.S.; Eighth Edition; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 9¼" x 6¼", pp. 374, with 58 illustrations. Price: 24s.

The first edition was published in 1940.

The Medical Journal of Australia

SATURDAY, APRIL 2, 1955.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

A MEDICAL PRACTITIONERS' FLOOD RELIEF FUND.

As announced in last week's issue, the Council of the New South Wales Branch of the British Medical Association has decided to establish a fund to aid medical practitioners whose practices have been affected by the recent floods in New South Wales. Many practitioners have had extensive damage done to their homes and private property. Consulting rooms have been damaged and much equipment has been either destroyed or rendered useless. Motor-cars have been damaged—in some instances beyond repair. In addition to this, medical practitioners in the affected areas asked for and accepted no fees for a period of about three weeks, but treated without question all who needed treatment. The loss of practice was considerable and this has thrown an additional burden on the practitioners of the area. It is true that numbers of medical practitioners have already subscribed to the flood relief funds, which are a credit to the generosity of the people of the Commonwealth; donations have come from States other than New South Wales and the response everywhere has been spontaneous and heartening. In spite of this, it is thought, and no doubt rightly, that medical practitioners who have not been affected by this recent disaster will wish to come to the aid of their stricken colleagues. It should be noted that the proposed fund is for the relief of all medical practitioners, whether they are members of the British Medical Association or not. We know that example is better than precept and may, therefore, refer to the plight of pharmacists, many of whom have lost their entire stock. We understand that wholesale pharmaceutical houses have undertaken to restock, free of charge, pharmacies whose stock has been lost. Donations to this medical practitioners' flood relief fund will be acknowledged in these columns. Let us therefore be in what Shakespeare calls a "giving vein" and let us also remember the old saying that bounty has no bottom. Donations should be sent to the Medical Secretary, New South Wales Branch of the British Medical Association, 135 Macquarie Street, Sydney.

DEATHS FROM MALARIA.

PLASMODIUM FALCIPARUM is a vicious but controllable killer. Robert H. Black, in his article "Deaths from Malaria on the Australian Mainland", published in this journal on March 12, 1955, draws attention to a disconcerting state of affairs not only in Australia but also in New Guinea. With the modern drugs available for prophylaxis there should be no *falciparum* malaria whatever among Europeans, who can easily procure and easily afford such drugs; yet not only are *falciparum* infections occurring, but they are causing deaths at extraordinarily high rates. Case fatality rates per thousand among Europeans quoted by Black are as follows: Australian Army, 1939 till 1945, 0·38. Papua-New Guinea, 1947 till 1952, 3·6. Australia (except New South Wales), 8·9. It must be assumed that almost all of these deaths were due to *P. falciparum*, since *P. vivax* and *P. malariæ* rarely cause death in normally healthy Europeans. Black's figures, although placed in conjunction, are actually not comparable. Deaths from malaria in New Guinea are due in the first place to neglected prophylaxis, and are thus to be blamed on the carelessness of the people concerned, while deaths from malaria in Australia are chiefly due to missed diagnoses. The figures for the Army clearly demonstrate the efficacy of supervised prophylaxis and the forced inclusion of malaria in every differential diagnosis.

Throughout New Guinea it is common knowledge that the only sure way to escape malarial fever is to take a suitable antimalarial drug regularly, yet large numbers of people neglect to comply with these requirements. Quinine is not a causal prophylactic, and is notoriously unreliable in controlling the New Guinea strains of *P. falciparum*, yet large numbers of "old-timers" still stubbornly use it; mepacrine is fairly satisfactory if taken in dosages which will maintain staining of the skin, but few, if any, of the professed adherents to the use of this drug show a yellow coloration. Proguanil, pyrimethamine, chloroquine and amodiaquine are true causal prophylactics for *P. falciparum* and satisfactory suppressants for the other species, but every practitioner in New Guinea is accustomed to hear from at least three-quarters of his malarial fever patients that they have missed taking their prophylactic drugs. Deaths are commonly due to fulminating cerebral malaria among careless adults and neglected children (that is, children whose parents fail to give them their prophylactic drugs), to blackwater fever among patients who neglect their prophylaxis and then take on their own initiative the wrong drugs at the wrong times, to gastric malaria which prevents the taking of drugs until it is too late, and to pernicious malaria among patients who are remote from medical care.

Failure to take prophylactic drugs in sufficient quantity while in malarious areas, and for a long enough time after malarious areas are left, must account for most of the attacks of *falciparum* fever which occur in Australia. Few of the patients concerned would be unable to consult a doctor, so it must be assumed that missed diagnoses are the chief reasons underlying the deaths reported. It must be granted that few Australian practitioners see cases of malarial fever, that those who saw the disease during the last war have by now forgotten most of what they knew about it, and that malaria presents itself in many puzzling ways; but diagnosis from a thick blood film treated by Field's stain is quick, easy and certain, provided only that malaria is included in the differential diagnosis. It is more than likely that the root of the trouble is failure to take a full history, so that the patient's previous residence in a malarious country is missed.

Current Comment.

MEDICAL EXPERIENCES IN THE TROPICS IN THE EIGHTEENTH CENTURY.

It is always interesting to read first-hand accounts of the work done by our predecessors and of the way in which they did it. Especially is this true of conscientious practitioners who, although they may not have recognized it, had a flair for clinical research. Such a one was Jean-Barthélemy Dazille, who was born in 1732 and died in 1812. Attention is drawn to him by M. Dumont[1] in a short article based largely on a work by Dazille, of which the shortened title may be taken to be "Observations on Tetanus". The full title, which is quoted, runs into six lines and reads like a short paper. (Some present-day medical authors also are not free from the tendency to give their writings titles like this, which may be described as the index-compiler's nightmare.) Dazille was a naval surgeon, and lived for twenty-eight years in the tropics, especially in Santo Domingo, where he was government medical officer for the Franco-American colonies and inspector-general of hospitals. In Canada he served in the battle for Quebec, and found occasion to extol the merits of conservative war surgery. He described how eleven surgeons had to operate on their knees, or at least in a very bent position, for more than twenty-four hours to extract 473 bullets. Dazille commented that the lives of all those men were saved by good surgery, which from then on preferred the honour of having saved a limb to that of having carried out a skilful amputation.

At that time the medical organization in the French colonies was in a bad state. There was a shortage of doctors, and to add to the difficulty some doctors carried on other occupations than the practice of medicine—for example, farming. One medical officer in Santo Domingo, who was in charge of a hospital of 700 beds, fell seriously ill and had to be away from his work for eight months; Dazille discovered that during all that time the hospital had no doctor, and promptly requested that a second in command should be appointed to prevent such an occurrence in the future. Dazille's comments on the teaching of anatomy in the colonies are piquant. He writes that in summer only "dry osteology, miology and angiology" can be taught; half the largest openings of the dissecting room must be placed on the side that catches the prevailing winds, and the other half on the other side. Dissections must be carried out while a breeze is blowing, and the professor, the prosector and the students must be to windward of the subject. In the matter of tropical diseases, Dazille attacks the commonly held theories. He holds that the "multitude of fevers" have been imagined by writers without experience, and that they are only subdivisions of the same fevers under different names. "These fevers are tetanus and causus, double tertian fever of a serious type in Santo Domingo, yellow fever in Martinique and Guadeloupe, persistent dysentery in Madagascar, and 'the Barber' or cold in the ribs in the peninsula of India."

Dazille's ideas about the ætiology of tetanus in infants are simply those that were current at the time; the umbilicus as a portal of entry and infection from soil were completely unknown. Dazille thought that white infants were less susceptible to tetanus than Negro infants because their clothing and constant supervision protected them. He certainly noted that the cabins of the natives were in contact with the earth, but thought that the damage was done by the dampness in them and by the suppression of perspiration. He was not interested in the causal connexion between the cutting of the umbilical cord and tetanus (*"mal de mâchoire"*), on the grounds that if there was such a connexion the white infants would be equally affected. Even a doctor with a well-trained mind such as he was could not escape the prevailing ideas concerning magic and sorcery in the causation of tetanus; he remarked that proof lay in the confession of several native midwives that they had deliberately brought about the disease, although they refused to say what means they had used to do so. Tetanus was often associated with sclerema (referred to by Dazille as "hardening of the cellular tissue"); he gives a gruesome picture of an affected infant. He held that sclerema was made worse by cold, which was the principal ætiological factor in tetanus, and referred to the "culpable negligence of leaving them [new-born infants] in the open air". Curiously enough, the suggestions he puts forward for the prevention of tetanus are rather in conflict with his ideas of causation. He urges the faithful examination of Negresses every week during their pregnancy, to make certain that they have not contracted some disease, particularly a venereal disease. He regards it as mandatory to treat such diseases during the pregnancy, in order to protect the infant from arriving in the world "in the shocking state just described". At that time tetanus was a dreaded scourge that carried off a large proportion of new-born babies (eight out of ten in 1841 on the island of Saint Kilda) by the seventh or eighth day.

The largest part of the doctor's work in Santo Domingo was obstetrical. Dazille in his conservatism seems to be somewhat in advance of his time. He writes that in the tropics Nature is nearly always able to conduct a normal labour, and waxes indignant against too hasty intervention, which creates dystocia, even though commonly undertaken with the laudable intention of relieving pain. However, disorders of pregnancy (abortions, fœtal death *in utero*, the occurrence of moles) are common, because of the poor quality of the semen in the tropics, due to masculine immorality and poor physique. Hæmorrhage was a constant threat to the life of the parturient woman. Dazille by his attitude of watchful expectancy was able to eliminate many of the causes of hæmorrhage occurring before the birth of the placenta. He insisted that the attendant Negresses should wait until the placenta was in the vagina before delivering it. No case of hæmorrhage occurred in patients under his care, and in seven years he was not once called out at night to a patient so treated. On the subject of hæmorrhage from uterine inertia occurring after delivery of the placenta, Dazille advises irritation and stimulation of the uterus, and sometimes the application of cold packs to the abdomen. Dazille's attitude to the *vernix caseosa* (called by him "exterior meconium") is interesting. He advises that it should be left to Nature to separate it from the infant, particularly in the tropics; it is one of Nature's methods of protecting the infant from the air. Cleanliness and the use of a solution of warm water and one-twelfth part of wine will detach what remains, which will fall off into the wrappings when it is no longer needed.

Dazille had an inquiring mind and a taste for research; these enabled him to record some useful and illuminating

[1] *Presse méd.*, December 29, 1954.

observations on medicine in the tropics. He early recognized the need for careful attention to hygiene and rigorous prophylaxis in order to combat the diseases with which he had to deal. His comments, although antique in some ways, in others are remarkably up to date.

THE RELIABILITY OF EVIDENCE.

EXCEPT for instances of perjury, when a witness deliberately tells lies for a definite purpose, it can safely be assumed that witnesses conscientiously try to tell the truth. It is, we know, easily demonstrated that people do not observe events correctly or describe them accurately, but within these limitations normal persons give their evidence without conscious bias or undue exaggeration. Henry A. Davidson,[1] however, in an article entitled "How Trustworthy is the Witness?" discusses the effect of the lesser emotional disorders, as distinct from frank insanity, on the credibility of evidence given by persons suffering from them. Dealing with the definite psychoses, he points out that the senile patient with a notoriously defective memory for recent events, and not uncommonly with delusions of ingratitude and infidelity on the part of his family, makes a most undependable witness; the over-talkative and over-confident manic type, who gives a superficial impression of sanity and stability, may be a dangerously misleading witness because he is very positive in giving his evidence, and his psychosis makes him more positive than the facts warrant; and the paranoid type, suspicious of everybody and everything, tends to over-emphasize minor matters and read meaning into meaningless incidents or circumstances. Emotional conflicts giving rise to psychoneuroses manifested by anxiety, depression or fantasy may result in false charges of rape or seduction or false confessions implicating either the witness himself or others. Davidson classifies a psychopathic personality as a person who is legally sane but is basically unreliable because of some underlying rebellion or dishonesty, or non-conforming tendency. Usually, at first sight, he appears to be intelligent, charming and impressive, but he can be a dangerous witness because he is an exhibitionist and a pathological liar. The mentally deficient person can be a good witness when describing some simple event, but his limited powers of observation and expression make him useless for more complicated evidence and he can always be easily discredited by skilful cross-examination. Alcoholism is important. If the witness was drunk at the time of an event, his evidence will be unreliable, and if he is a chronic alcoholic his evidence cannot be trusted. A drug addict, on the other hand, provided his evidence is not related in any possible way to his addiction, and provided he was not suffering from withdrawal symptoms at the time of an event or at the time of giving evidence, can be a normal witness. Davidson's first suggestion, that counsel be assisted in court by a psychiatrist who can direct the questioning of witnesses so that these hidden psychoses are brought to light, is possibly practical if the number of seemingly irrelevant questions about the witnesses' background are allowed to pass unchallenged by the court or opposing counsel, but then he states that logically a witness ought to be required to submit to psychiatric study whenever his testimony is vital and his competence has been responsibly questioned. However, whereas evidence concerning the mental state of the actual parties to a suit is relevant and acceptable, the collateral witnesses who, after all, are not on trial but are simply doing their best to assist the court, should not have their underlying mental defects exposed to the public, no matter how relevant these might be. Nor would there be many witnesses forthcoming under such conditions. Moreover, the time consumed in hearing the evidence of psychiatrists concerning the witnesses would unduly prolong a case with only doubtful benefit; and to pursue the principle to its logical end, who would then examine the psychiatrists as to their value as witnesses? If we carried Davidson's ideas far enough, we should arrive at a state of affairs in which the psychiatrist would try the case and not the magistrate or judge.

[1] *J. Forensic Medicine*, January-March, 1955.

THE FALLACIES OF SKIN TESTS.

ONCE there was a patient who frequently, but not invariably, developed a massive urticarial reaction after going to a party. After innumerable skin tests had been performed, all with negative results, and demands for exhaustive lists of ingredients had exasperated innumerable hostesses (for the patient was an indefatigable partygoer), it was discovered that the urticaria appeared only when the drinks were based on gin and the *hors d'œuvres* contained anchovies—and nobody had thought to perform skin tests with a gin-extract of anchovies. This case is recalled by Max Samter's article,[1] "The Meaning of Skin Tests in Allergy", wherein he, in effect, reiterates the ever-timely warning that laboratory procedures cannot be substituted for clinical diagnosis. Negative results of skin sensitivity tests can be fallacious for various reasons: antibodies are not, in fact, evenly distributed through the so-called "shock tissues"; they may be carried only in the respiratory mucous membrane and not in the skin. In food allergies especially, the extracts used for testing may not contain the essential fraction, or the allergen may be a metabolite differing from the original food substance. It must be remembered that positive results of skin tests mean only one thing: that the patient carries antibodies against the specific substance in his skin. Samter offers an interesting hypothesis. If, in a child, an undenatured allergen passes through the gastro-intestinal mucous membrane and reaches the site of antibody formation, antibodies will form and lodge in the skin. Subsequent absorption of allergen will not only produce an antigen-antibody reaction in the skin, but also stimulate additional antibody production. Clinical evidence suggests that as the child grows, the gastro-intestinal tract alters in its permeability to the allergenic fractions of many foods; and since antibodies remain in the skin for long periods, there may be a positive reaction to some skin tests long after the actual allergic reaction has ceased to occur. This hypothesis may also serve to explain why so often the patient sent to an allergy clinic for general skin testing returns with a long list of positively reacting allergens, most of which are nevertheless known to cause no allergic symptoms. That the guilty agent is almost certainly hidden somewhere in the list is no help. Sampter goes on to describe an experiment on two groups of patients suffering from various allergies; in the first group, an attempt was made to establish the ætiology of the allergies exclusively on the basis of skin tests, with approximate results in 10% of cases; in the second group, adequate results were obtained in 70% of the patients by studying them clinically and assessing their histories without any recourse to skin tests. All this confirms the view that probably the surest way of getting a lead to the causative allergen is the old-fashioned method of demanding from the patient, as soon as an allergic attack develops, a written account of all foods ingested, plants and flowers handled or smelled, and other relevant data covering the twenty-four hours preceding the attack, holding these lists until three are secured, and then comparing them.

[1] *Illinois M. J.*, December, 1954.

A TRIBUTE TO DR. CHARLES PALMER.

THE friends of Dr. Charles Reginald Palmer, who has practised for forty-five years in the Bulli district of New South Wales, will be delighted to hear of an honour which was done to him by the citizens of the district which he has served. On Thursday, March 10, 1955, some 800 persons representative of the entire community gathered in Bulli's Theatre Royal to do honour to Dr. Palmer. Sir Earle Page, the Federal Minister for Health, had been invited

to take part in the function, and he was accompanied by Dr. J. G. Hunter, the Medical Secretary of the New South Wales Branch of the British Medical Association. Mr. Sid Wearne, the chairman of the organizing committee of the function, received the Minister and presided. He said that with the exception of three years spent on active service Dr. Palmer had devoted the whole of his professional life to the people of the Bulli district. Sir Earle Page said that Dr. Palmer was typical of the fraternity of family doctors who were serving the community. On behalf of the citizens of the Bulli district he presented Dr. Palmer with an illuminated address of appreciation, with a substantial cheque and with a gold wristlet watch. Dr. John Hunter spoke and said that long service in the medical profession such as Dr. Palmer had given was worthy of the highest tribute the community could offer. Dr. Bertram Cook spoke on behalf of the South-Eastern Local Medical Association, and the deputy mayor of Greater Wollongong (Alderman A. Squires) also spoke. Alderman Squires, on behalf of the city, presented Dr. Palmer with a solid silver tray bearing the crest of the City of Greater Wollongong. On behalf of the women of the district, Mrs. Wearne presented Mrs. Palmer with a cake tray and a sheaf of flowers. Dr. Palmer replied.

CARCINOGENESIS AND OCCUPATION.

THE discovery of the relation of chimney sweeping to scrotal cancer was made by Percival Potts in 1775, but it is only during the last few years that the extent of the relationship of carcinogenesis to occupation has been recognized.

I. Macdonald[1] has studied the environmental factors of occupational origin related to carcinogenesis. He states that the number of industries utilizing substances from which it is known or suspected that carcinogens may be derived is increasing and also the number of persons exposed to carcinogens. The list of known carcinogens in industry is already imposing: paraffin, shale oil, arsenic, tar and pitch, anthracene, creosote, benzene, aromatic amines, chromates, aniline dyes, β-naphthylamine, ultraviolet rays, X rays, radium and fissionable material. Other substances are known to be carcinogenetic in some animals and may be in man. In mice, for example, carbon tetrachloride produces primary cancer of the liver, urethane gives rise to cancer of the lungs and the solvent diethylene glycol produces cancer of the urinary bladder. The mechanism of action of potential carcinogenesis in the occupational environment is not as direct as might be thought. The potentiality of various agents as carcinogens depends on their type, their species specificity, the time and intensity of exposure, and, most important, the responsiveness of the person exposed. It is possible, Macdonald thinks, that the capacity to respond to a carcinogen is established by genetic inheritance, and that this may account for the variability in response of different persons to the same agent, in the same intensity, over the same period of time. Thus millions of persons develop dyskeratoses as a result of exposure to chemicals, but only in thousands does the malignant progression occur. All the known carcinogenetic agents produce non-malignant lesions of various kinds in much greater number than cancers. Thus hyperkeratosis is produced by long exposure to anthracene, arsenic, asphalt, creosote, crude mineral oil, crude paraffin, pitch, sodium nitrate, soot, tar, radioactive substances, radiation including ultraviolet, and all these are carcinogens. Individual susceptibility as shown by the development of pre-malignant lesions provides a method for mass screening that filters out the employees to whom the occupation is a hazard. An outstanding example quoted is the development of papillomata of the urinary bladder in aniline dye workers, 30% or 40% of whom will have this precancerous process. Detection and eradication of the papillomata and removal of the employees so affected from contact with the carcinogens can reduce the incidence of cancer of the bladder from this cause to nearly zero.

The effects of X rays, radium and fissionable material are referred to by Macdonald. They are well known, and adequate measures are now usually employed to remove affected persons from the source of injury. Similar care is necessary in the control of occupational cancer hazards of other kinds. It is obvious that not all the carcinogenic hazards in industry are known, and practitioners will agree that an alert awareness on the part of industrial physicians in the recognition of the possible carcinogenicity of new substances is essential. Since there is hardly a single industry now in which at some stage at least one known carcinogen is not found, exposure to known carcinogens should be reduced to a very low level. Adequate protective clothing, respirators and gloves should be provided when indicated, and other protective and hygienic measures should be explained to and enforced on employees. The escape of wastes which contain carcinogenic substances should be carefully controlled.

THE PREVENTION AND TREATMENT OF RHEUMATIC FEVER.

THE greater part of the issue of *The American Journal of Medicine* for December, 1954, is taken up by a symposium on rheumatic fever and rheumatic heart disease.[1] Several of the papers deal with prevention and treatment.

It is very widely accepted now that group A streptococcus is the inciting agent both for first attacks of rheumatic fever and for recurrences of the disease. Numerous surveys have demonstrated the occurrence of epidemics of rheumatic fever following outbreaks of scarlet fever and other streptococcal infections, particularly streptococcal pharyngitis. Although streptococci are not always found in the tissues of rheumatic subjects, there is increasing evidence that living streptococci must be present, in the oropharynx or elsewhere, in order for rheumatic fever to develop. How the streptococci act in producing rheumatic fever is still a matter being much discussed. Intelligent use of chemotherapeutic agents should, by destroying streptococci in the body, make rheumatic fever prophylaxis possible. Within a few years of the introduction of sulphonamides this group of drugs was shown to have great value in the prophylaxis of rheumatic fever (see THE MEDICAL JOURNAL OF AUSTRALIA, July 19, 1947, page 79), and later penicillin was shown to have still greater value (*ibidem*, October 27, 1951, page 569). Sulphonamides have been found of no benefit in established cases of rheumatic fever.

F. J. Catanzaro *et alii* discuss in some detail "The Role of the Streptococcus in the Pathogenesis of Rheumatic Fever" and G. H. Stollerman has considered the "Use of Antibiotics for the Prevention of Rheumatic Fever". Catanzaro and his collaborators studied over 1000 young airmen admitted to hospital for exudative tonsillitis or pharyngitis. The study was divided into two parts. In the first part 301 men received penicillin and 288 were given placebos to act as controls. In the second group 297 received penicillin and 291 sulphadiazine. Group A streptococci were isolated from the initial culture of the throat in all cases. The patients who received sulphadiazine experienced no protection against rheumatic attacks as compared with the controls. In these two groups there were 20 rheumatic episodes observed from the tenth to the forty-sixth day among the 450 patients, while of the 420 patients who received penicillin only three developed acute rheumatic fever. Stollerman, on the other hand, gives figures collected from the literature showing 14% rheumatic attacks in controls and 1·9% with sulphonamide prophylaxis. Stollerman states that in addition to proven effectiveness, sulphadiazine has the advantage of being easy to administer, relatively inexpensive and of low toxicity. But sulphonamides do not eradicate the streptococcal carrier state and are useful therefore primarily in preventing new streptococcal infection after the streptococci have been eradicated by other means.

[1] *J.A.M.A.*, January 1, 1955.

[1] *Am. J. M.*, December, 1954.

He favours the use of repository benzathine penicillin mainly because ambulatory patients are apt to forget to take penicillin by mouth regularly. As a prophylactic measure during epidemics of streptococcal respiratory infections single daily oral doses of 50,000 to 100,000 units are effective in preventing streptococcal infections in most cases. There is no evidence from studies of mass prophylaxis in the Armed Forces of the United States of America that the widespread use of penicillin prophylaxis is giving rise to any change in the sensitivity of group A streptococci to penicillin. When rheumatic fever has appeared in a patient the treatment has to be quite different. C. McEwan discusses the present position in the treatment of rheumatic fever. He points out that the importance of preventing hæmolytic streptococcal infections in patients who have recovered from rheumatic fever has been established. He thinks that it must now be considered imperative to start the prophylactic regimen just as soon as the measures to eliminate any possible hæmolytic streptococcal carrier state have been completed. Sulphadiazine is useful here, for it will prevent infection, but will not eliminate streptococci the patient is harbouring. Penicillin may be given either daily if it is given by mouth or every four weeks if benzathine penicillin is given intramuscularly. When the disease is established cortisone and corticotropin are of unquestionable value in combating the polyarthritis, the fever and the general toxic state. For the control of carditis these hormones have proved disappointing on the whole. Data have been collected from 13 clinics in the United States, in Canada and in England. Little difference was found in the results obtained with acetylsalicylic acid, cortisone and corticotropin. Possibly the doses of the hormones were not sufficiently large, for in other groups in which much bigger doses were used considerable success has been claimed in the prevention of cardiac damage. Doses of 25 milligrammes of cortisone by mouth four to six times daily have produced dramatic relief of polyarthritis, fever and general toxic state, but full doses of salicylates (0·06 gramme per pound of body weight) will accomplish essentially the same result. Indeed when cortisone is given intramuscularly the effects are less dramatic than those achieved with salicylates. We read that although a final decision is not yet justified, it is probable that rheumatic cutaneous nodules are favourably influenced by cortisone and corticotropin. There is considerable difference of opinion as to the action of these hormones in chorea. In regard to rheumatic carditis the value of the hormones is not yet established beyond question, but the results are encouraging, especially when the therapy can be started within a few days of the onset of the condition. Hormones have little if any value in subacute and chronic carditis. The value of the salicylates in carditis is still less clear, but there is evidence of the beneficial effects of combined salicylate and cortisone treatment. For the other manifestations of rheumatic fever salicylate is probably preferable to cortisone or corticotropin.

Based on these considerations, C. McEwan gives a plan of treatment of rheumatic fever which may be summarized as follows.

1. Penicillin should be given at once in sufficient doses to eradicate the hæmolytic streptococcal carrier state.

2. Prophylaxis should then be begun and continued indefinitely to prevent further infection with streptococci.

3. If there is no evidence of carditis, salicylate alone is probably preferable to hormone therapy. The dosage for acetylsalicylic acid should be 0·06 gramme (one grain) per pound of body weight daily for two days, then 0·04 gramme (two-thirds of a grain) per pound daily for five days, and 0·03 gramme per pound daily for three weeks. After this the salicylate may be reduced 1·0 gramme daily provided C-reactive protein has disappeared from the blood.

4. In the presence of carditis cortisone should be started at once in doses of 300 milligrammes daily by mouth. This is continued for six weeks, after which the dose is reduced half a tablet (12·5 milligrammes) daily. A rigid diet containing less than 50 milligrammes of sodium daily is imperative because of the salt-retaining effect of cortisone. Potassium chloride in enteric-coated pills in doses of 1·0 gramme two or three times daily should be given.

5. If salicylate is given with cortisone, it would seem advisable to continue salicylate dosage at the level of 0·03 gramme per pound of body weight daily for three weeks after administration of cortisone has been stopped.

CARDIAC PATIENTS AND RADIOACTIVE IODINE.

In 1950 H. L. Blumgart, A. S. Freedberg and G. S. Kurland reported[1] on the treatment of euthyroid cardiac patients by inducing hypothyroidism with radioactive iodine (I^{131}); all patients had shown evidence of continued incapacity despite having received all standard forms of therapy. The results obtained were so promising that they distributed a *questionnaire* to 50 clinics using radioactive iodine in many centres in the United States of America. The results of I^{131} treatment of euthyroid patients with advanced cardiac disease have been accumulated and analysed.[2] The entire group consists of 1070 patients. The method of treatment was suggested by the fact that the work of the heart is lessened in myxœdema and that alleviation of congestive failure and *angina pectoris* has long been witnessed in thyrotoxic patients when the metabolic rate is lowered from hyperthyroid to normal levels. It is suggested that the treatment with I^{131}, by lowering the total metabolism of the body, places the systemic circulatory requirements within the limit of the cardiac reserve. The treatment has been used in those cases of congestive failure and *angina pectoris* which fail to respond to other forms of treatment. In the consideration of the patients treated an excellent result means marked improvement over pre-treatment status with either no recurrence of symptoms or a marked reduction, despite increased activity. A good result indicates definite improvement with a decrease in frequency and severity of attacks of angina or congestive failure on the same amount of activity as before treatment. In the remainder of the patients there was no worthwhile improvement. In the 720 patients with intractable *angina pectoris* 76% showed worthwhile improvement, 40% excellent results and 36% good results. In the 350 patients with congestive failure 62% showed worthwhile improvement; 23% showed excellent results and 39% good results. Of the 1070 patients, 630 have been observed for more than one year after the commencement of treatment.

Rather different amounts of radioiodine were given in the different clinics, and the authors recommend that the initial dose be not larger than 20 millicuries or, in those who have anginal attacks during rest in bed or during the night, 10 millicuries. These doses are given at weekly intervals for three doses, and patients with *angina pectoris* decubitus must restrict their activities during this three weeks. At intervals of one to two months additional single doses are given until hypothyroidism becomes manifest. With this regime thyroiditis has not been a serious problem. The onset of improvement was coincident with the occurrence of hypothyroidism and was usually two to six months after the initiation of treatment. The first clinical intimations of incipient hypothyroidism may consist of one or more of the following: slight fullness or puffiness of the face; increased sensitivity to cold; slight stiffness of the joints, arthralgia or paræsthesias. At the same time the patient reports that the attacks of angina are milder or less frequent or that dyspnœa and orthopnœa are diminished. A daily dose of desiccated thyroid, 6 to 12 milligrammes, should then be administered. Blumgart and his co-workers state that in each patient thyroid dosage must be adjusted to maintain him at the lowest metabolic level at which he experiences maximum relief from his cardiac disease and the minimum discomfort from myxœdema. If metabolic rate returns to normal level thyroid should be stopped and I^{131} again administered.

[1] *Circulation*, May, 1950.
[2] *J.A.M.A.*, January 1, 1955.

Abstracts from Medical Literature.

PÆDIATRICS.

Effects of Hypoxia, Carbon Dioxide and Oxygen on Infants' Respiration.

H. C. Miller and F. C. Behrle (*Pediatrics*, August, 1954) present two papers based on their studies of respiration in the neonatal period. In the first of these papers they report investigation of the response to the administration of atmospheres containing 10% and 12% oxygen mixtures to healthy newborn infants. Infants under twenty-four hours of age tended to hypoventilate throughout the period of anoxia. Infants six to eleven days of age hyperventilated for two or three minutes and then showed a decrease, while infants sixteen to forty-eight days of age showed a greater increase in ventilation, which was still poorly maintained compared with adult responses. Hypoxia increased the incidence of periodic breathing in the two older groups of infants. The authors consider that these results are in keeping with the theory that chemoreceptor reflexes are poorly developed at birth. The difficulty in producing periodic respiration in the first twenty-four hours of life, as compared with later, they consider to be further evidence of anaerobic metabolism in the medullary centres at birth. In their second paper the authors present the results of investigation of the responses of newborn infants rendered hypoxic with low oxygen concentration atmospheres, to the administration of 5% carbon dioxide with 12% to 95% oxygen and to 100% oxygen. Minute volumes were restored more quickly and to a greater extent when carbon dioxide-containing atmospheres were administered. They consider that condemnation of the use of carbon dioxide in the treatment of *apnœa neonatorum* is undesirable without further investigation of these problems.

Genetics of Gargoylism.

Robert C. Cunningham (*J. Neurol., Neurosurg. & Psychiat.*, August, 1954) reports 12 cases of gargoylism from the pedigree of a British family. All the subjects exhibited clear cornee, low-grade defectiveness and normal skin. The pedigree demonstrates the presence of a sex-linked, recessive gene—males are exclusively affected. The average age at death was 8·7 years.

Resuscitation of the Newborn.

R. M. Cherniack and A. Boyd (*Pediatrics*, July, 1954) point out recent work showing that a pressure of 40 centimetres of water effectively overcomes atelectasis in newborn animals, without producing lung damage if the pressure is applied for less than 0·25 second. They have developed a resuscitator operating on these principles. It consists of a solenoid valve, which is activated by a cam rotating on a clock motor. Activation of the solenoid closes the valve for 0·1 second ten times per minute, diverting the flow of oxygen into the endotracheal tube. A spring-loaded pressure safety valve limits the pressure to 50 centimetres of water. The setting of the reduction valve on the oxygen cylinder also limits the pressure. The new resuscitator was successful in reviving six out of seven apnœic infants after other resuscitative measures had failed. It is considered that the results show that the use of high inflating pressures may initiate respiration when other methods fail.

Lead Encephalopathy.

S. P. Besman, M. Rubin and S. Leiken (*Pediatrics*, September, 1954) report the results of treating seven children suffering from lead encephalopathy with the neutral disodium calcium salt of ethylene diamine tetracetic acid (calcium EDTA). They state that this substance is a chelating agent. All such agents are capable of forming bonds with multivalent metals, and in the case of EDTA even calcium forms such a tight bond that EDTA may be used as an anticoagulant. Lead forms a stronger complex with EDTA than does calcium and is therefore taken up preferentially. Of the seven children treated, all but one showed prompt clinical improvement; and the authors consider that if the plan of treatment which they now propose had been used, that child also might have survived. Their suggested plan of treatment is to give 0·5 gramme of calcium EDTA subcutaneously or intravenously every eight hours for five days, followed by a three-day rest period, with repetition of the five-day course. No signs of toxicity of calcium EDTA were noted.

Neonatal Convulsions.

J. B. Burke (*Arch. Dis. Childhood*, August, 1954) has studied the case histories of all infants recorded as having convulsions or muscular twitchings in the Jessop Hospital, Sheffield, over a period of five years. There were 46 cases out of a total of 8679 deliveries (0·2%); 18 of the infants died within a few days of birth. Cerebral hæmorrhage was the cause of death in nine cases, anoxia in six. From the evidence it is considered that of the survivors birth trauma or anoxia was the cause of convulsions in 20. In three there was no history of abnormal delivery or of cyanosis. One infant had hydrocephalus and *spina bifida*, and of the remaining 27 followed up five were severely mentally retarded, spastic quadriplegia was present in one of these, and further convulsions had occurred in two; a sixth child was blind in one eye.

Recovery from Meconium Peritonitis.

J. F. R. Bentley and D. J. Waterston (*Lancet*, November 13, 1954) report two cases in which infants recovered from congenital meconium peritonitis. In one case the inflammation was acute, in the other chronic. They review published reports of nine previous survivals and state that although the mortality remains high, successful treatment is becoming commoner. They consider it the responsibility of the obstetrician to seek early surgical aid for babies with abdominal distension or bilious vomiting, which are the leading clinical features of the disorder. The abdominal lesions may include all stages from acute to chronic meconium peritonitis; the perforated intestine may be leaking or healed; and intestinal obstruction may, or may not, be present. Surgical treatment depends on the combination of lesions. The authors state that there is reason to believe that most of those who survive will grow into healthy adults.

Micturating Cysto-Urethrography in the Investigation of Enuresis.

O. D. Fisher and W. I. Forsythe (*Arch. Dis. Childhood*, October, 1954) investigated by micturating cysto-urethrography 135 children suffering from enuresis, who had failed to respond to at least three months' intensive medical or psychiatric treatment. A 25% suspension of barium sulphate was used as the contrast medium, unless the residual urine exceeded one ounce, in which case 12% diodone solution was used. In 43 boys and 31 girls no organic abnormality was found, and the enuresis was considered to be functional in origin. In 41 boys and 20 girls this procedure revealed abnormalities of the urinary tract. These included valves of the posterior part of the urethra (25), neurogenic disorders of the bladder (12), wide bladder neck anomaly (14), small capacity bladder (4), meatal stenosis (2), ureteral reflux (2), stenosis of the membranous part of the urethra (1) and congenital hypertrophy of the vesical neck (1). The symptoms and signs of the organic disorders did not distinguish them from the functional. The authors comment that urethral valves are much more common than is generally realized and that early recognition is important because of the possibilities of infection or renal damage in later life. The typical funnelling of the bladder neck found in those with neurogenic disorder of the bladder was associated with *spina bifida occulta* in 10 of their 12 patients with this abnormality, but no other nervous system anomalies were detected in any. They consider micturating cysto-urethrography an essential part of the investigation of persistent enuresis.

Familial Dysautonomia.

C. M. Riley, A. M. Freedman and W. S. Langford (*Pediatrics*, November, 1954) present a further report on a clinical entity, familial dysautonomia, first defined in 1949. In 47 of the 48 cases on which this report is based the subjects were children of Jewish extraction. Inheritance on Mendelian recessive lines seems likely. As the name of the condition indicates, there is much evidence of autonomic dysfunction. Defective lachrymation, frequent sweating, skin blotching with excitement, lability of blood pressure with considerable postural hypotension, inadequate temperature control and emotional instability are prominent signs. Retarded motor and speech development, depressed reflexes, indifference to pain and stunting of growth are associated features. Episodes of vomiting, pneumonia or severe personality change are frequent. Psychologically there is progressive impairment in dealing with concrete tests without impairment of abstract thought. The death rate from inter-

current function has been high. The authors postulate that a fuctional derangement of the central nervous system causes autonomic disturbances which lead the child to over-react to emotional stimuli. His emotional outbursts build up feelings of guilt in the parents, who accede to any demand, creating an unstable environment for the child and increasing his anxiety and sense of insecurity. Thus a vicious circle is created. Though related to childhood schizophrenia and the picture of the "brain damaged" child, it is considered a separate entity. In the treatment of crises chlorpromazine and phenobarbital have been used. A rigid routine is laid down for the parents to minimize their fear and guilt and the child's environmental manipulation.

Aminophyllin Poisoning.

V. J. ROUNDS (*Pediatrics*, November, 1954) presents reports of six children who had toxic reactions to aminophyllin. They state that these toxic effects may be considered in three categories: first, signs of central nervous system stimulation such as restlessness, confusion and convulsions; second, gastric irritation resulting in severe vomiting; third, effects on the kidney causing albuminuria. All these manifestations were seen in the cases reported. Slow waves were marked in the electroencephalogram in the recovery phase. The patients were aged between eleven months and three years and had received doses of aminophyllin varying from 100 milligrammes given intravenously to 0·75 gramme given by suppository. The author considers that alertness for toxic effects will prove aminophyllin to be a common cause of poisoning.

ORTHOPÆDIC SURGERY.

Electromyography and Prognosis in Acute Anterior Poliomyelitis.

H. HERTZ, A. MADSEN AND F. BUCHTHAL (*J. Bone & Joint Surg.*, October, 1954) have investigated action-potential characteristics and muscle force in 45 patients in repeated examinations during the initial stage of poliomyelitis and one year after the onset of the disease. The symmetrical normal muscles and 130 normal subjects served as controls. The authors found that in the acute stage of the disease the mean action-potential duration was increased 30% in severely affected muscles which did not show signs of recovery one year later ($10·5 \pm 0·4$ milliseconds as compared with $8·2 \pm 0·2$ milliseconds in normal muscles). Muscles which were equally severely paretic in the acute stage, but which improved greatly in the course of one year, had normal values of mean action-potential duration. Muscles with a less severe paresis but with no or slight recovery had a normal mean action-potential duration. One year after the acute stage all affected muscles, independent of the degree of recovery, showed an increase in mean duration of approximately 20% above normal. The authors state that there was a considerable increase in the incidence of polyphasic potentials in the acute stage of the disease. This increase could not, however, account for the increase in mean action-potential duration. The mean action-potential amplitude recorded during the initial stage of the disease was within normal limits (290 microvolts) for all groups and was increased by 50% to 150% one year after the onset without correlation to the degree of recovery. Fibrillation potentials (spontaneous low-voltage activity of short duration) occurred in 62% of all paretic muscles in the initial stage and in 35% one year after the onset of the disease. The earliest sign of denervation was found thirteen days after the onset of the disease. In acutely paretic muscles which later recovered slightly or not at all, fibrillation potentials occurred more frequently (75%) than in severely paretic muscles which showed good recovery (33%). Synchronous activity between different leads in the same muscle was clearly correlated to the degree of recovery. It occurred in 40% of paired leads in severely paretic muscles which did not recover (examined in the acute stage) as compared with 20% in the other groups and in normal controls. In the initial stage of the disease the thermo-electrically measured intramuscular temperature was significantly decreased (0·9° C.) in severely affected muscles without recovery, as compared with the other groups and normal controls. One year later there was a similar tendency. The authors conclude that the finding of a correlation between muscle action-potential characteristics on the one hand and degree of recovery on the other indicates that the eventual outcome of the muscle paresis is largely determined by the initial disease process. Early electromyography may thus provide a guide on which muscles will and which will not benefit by physical therapy.

Sprain of the Pisiform-Triquetral Joint.

A. M. SMITH (*J. Bone & Joint Surg.*, November, 1954) during the last two years has had six patients suffering from sprain of the pisiform-triquetral joint. These patients had symptoms resembling those of "tenosynovitis" of the *flexor carpi ulnaris* tendon—namely, ache in the region of the pisiform bone brought on or made worse by exertion, especially heavy lifting. On examination of the patients a constant finding was pain on resisted flexion of the wrist, greatest in the position of ulnar deviation. Pain was also elicited when the patient held a heavy object in the outstretched hand with the forearm in supination. Signs and symptoms in these patients differed from those of tenosynovitis of the *flexor carpi ulnaris* in that on passive movement of the pisiform bone pain was caused, and in two cases crepitus was elicited. The author regards the test of pain on passive movement of the pisiform as diagnostic of sprain of the pisiform-triquetral joint. Many treatments were tried. Immobilization in a plaster cast was unsuccessful. Division of the tendinous slip attaching the *flexor carpi ulnaris* to the pisiform was also unsuccessful. Excision of the pisiform in one case effected relief. The best procedure was fusion of the pisiform-triquetral joint by erosion of contiguous articular cartilage and fixation of arthrodesis by a small vitallium screw.

Delayed Union and Non-Union.

M. R. URIST *et alii* (*J. Bone & Joint Surg.*, October, 1954) state that the mechanism of non-union of fractures of the tibia common to all clinical circumstances of this condition is fibrinoid degeneration of connective tissue in the interior of the callus. Fibrinoid tissue forms when the bone injury has been extensive, has been complicated by infection or has been difficult to immobilize. The process appears to be similar to that found in chronic adventitious bursitis. The authors consider that if motion and friction are not controlled, fibrinoid degeneration continues indefinitely, and a permanent pseudarthrosis may develop. Immobilization acts as a deterrent to the formation of fibrinoid tissue and permits the refilling of the defect with new fibro-cartilaginous callus. Fibrinoid tissue is not a simple barrier to osteogenesis; it indicates defective callus. Fibrinoid tissue fails to draw osteogenesis from the periosteum and endosteum across the fracture gap. According to interpretations of the newer theory of osteogenesis, it lacks the ability of cartilage and fibrocartilage to promote new-bone formation by induction. The authors believe that the effect of open operations on fresh fractures is to increase the volume of damaged bone which has to be absorbed and replaced before the fracture can unite and permit full weight-bearing on the leg. Comminuted fractures of the shaft of the human adult tibi should be considered non-operable fractures during the first six months of healing, because the trauma added by surgery exceeds the normal capacity for bone regeneration in this area of the skeleton. Bone grafting, without excision of the fibro-cartilaginous callus, may be applied successfully in ununited fractures of the tibia before eighteen months of healing. Excision of the pseudarthrosis osteotomy of the fibula and telescopin of the fracture ends are advisable in ununited fractures after eighteen months. All the standard surgical procedures of onlay, inlay or intramedullary bone grafting are capable of producing union with the aid of one additional year of immobilization of the fracture, but the success of the operation is determined by the proliferative reaction of the bone ends, not the bone graft. If the bone ends are in close contact, the function of the graft appears to be that of an inductor. The authors found that recurrence of sepsis was the chief cause of failure of all types of bone-graft operations. They state that skiagrams which show a diffuse increase in density of bone tissue three or four centimetres above and below the fracture line indicate latent sepsis. In such cases six months, or even two years, without drainage is not a safe period of waiting to permit a bone-graft operation. Only synostosis operations which avoid the fracture site are free of risks of further damage to the bone ends by infection. The authors conclude that radical leg-shortening procedures are an alternative to amputation and may be applicable in old ununited fractures with large soft-tissue defects after repeated failure of bone-grafting.

British Medical Association News.

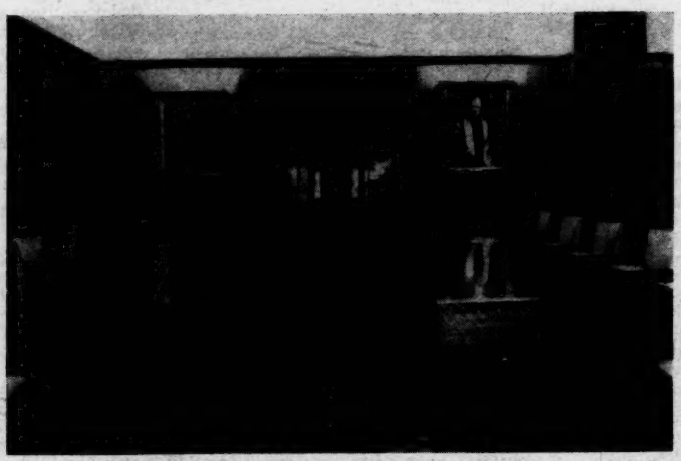
SOUTH AUSTRALIAN BRANCH NEWS.

On December 2, 1954, His Excellency the Governor of South Australia, Air Vice-Marshal Sir Robert George, K.B.E., C.B., M.C., paid an official call to Newland House, the new headquarters of the South Australian Branch of the British Medical Association, at 80 Brougham Place, North Adelaide. He was met on his arrival by the President, Vice-President and Honorary Medical Secretary and conducted to the Council Chamber.

Newland House.

In a short address of welcome, the President, Dr. I. B. Jose, said that the Council was greatly honoured by the visit of His Excellency the Governor to the new home of the Branch. They wished on that occasion to convey through His Excellency a loyal greeting from all members of the South Australian Branch of the British Medical Association to Her Majesty the Queen, who was patron of the British Medical Association. They were honoured and gratified that His Excellency had recently consented to be patron of the South Australian Branch.

Dr. Jose went on to say that the South Australian Branch had been formed in 1879 under the leadership of the late Dr. William Gosse, great-grandfather of the present generation of that Adelaide family. The purpose of the Branch was to uphold and further the scientific and ethical traditions of the profession and to guide its public relations. The Branch had had its headquarters in several places throughout the years, but now, owing to the foresight and efforts of some, not the least of whom was a revered member and friend, Sir Henry Newland, in whose honour the building had been named, they had acquired a new home for the Branch. They hoped to add to it a large meeting hall and other accessories in the course of time. Dr. Jose explained that Council members, apart from some office-bearers, were elected by the body of the profession and served for two years. One-half of the Council changed each year. There were always at least two country members on the Council.



Council Chamber.

In conclusion, Dr. Jose said that the visit of His Excellency the Governor was in recognition of the part played by the medical profession in the life of South Australia. They expected that part always to uphold the highest traditions of the past. Dr. Jose hoped that His Excellency the Governor would meet with the members of the Branch often, but that such meetings would always be on the social and not on the professional level.

In reply, His Excellency the Governor thanked the President and members for their welcome. In expressing

his pleasure at becoming patron of the Branch he spoke of the important position of the medical profession in the community. In conclusion, he said that he would convey to Her Majesty the Queen the loyal greetings of the members of the Branch.

His Excellency the Governor was then introduced to the individual members of the Council by the President, and refreshments were served.

NEW SOUTH WALES BRANCH NEWS.

Section of Occupational Medicine.

A MEETING of the Section of Occupational Medicine of the New South Wales Branch of the British Medical Association will be held at 8 p.m. on Thursday, April 14, 1955, in the William H. Crago Council Chamber, British Medical Association House, 135 Macquarie Street, Sydney. The subject for discussion will be "Injury in Conditions of Uncertain Ætiology", and a paper will be read by Dr. W. Hugh Smith.

A cordial invitation is extended to all members of the Association to attend this meeting, and to join the Section of Occupational Medicine, as it is desired to make membership of this section as fully representative of the medical profession as possible.

The annual subscription is ten shillings, and further inquiries concerning the activities of the section may be obtained from the Honorary Secretary, Dr. Gordon C. Smith, School of Public Health and Tropical Medicine, University of Sydney.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on September 23, 1954, at Sydney Hospital, Sydney. The meeting took the form of a series of clinical demonstrations by the members of the honorary medical and surgical staffs of the hospital.

Staphylococcal Pneumonia.

DR. W. L. CALOV showed a female patient, aged thirty years, who had been admitted to hospital on May 25, 1954, with a history of cough of one month's duration and of anorexia, fever and loss of weight over a period of one month. She looked very ill at the time of her admission to hospital, and was wasted. Her cough was persistent and also paroxysmal, and associated with retching and vomiting. She had a high temperature.

Signs of consolidation of the upper lobe of the right lung were noted. The sputum was blood-stained. The patient had been treated with penicillin prior to her admission to hospital, but without improvement. A blood count gave the following information: the hæmoglobin value was 9·3 grammes *per centum* and the hæmoglobin content of the erythrocytes was full; an occasional normocyte was seen and platelets were plentiful; the leucocytes numbered 12,300 per cubic millimetre, 86% being neutrophile cells, 10% lymphocytes and 3% monocytes; a "shift to the left" was detected in the eosinophile cells, and the basophile cells showed toxic changes. Neutrophilia was obviously present. The erythrocyte sedimentation rate was 138 millimetres in one hour. At a bronchoscopic examination neoplasm was suspected; pus was seen coming from the right upper lobe bronchus, but no evidence of neoplasm was found. Examination of the sputum revealed no acid-fast bacilli. From material obtained by bronchoscopic suction *Staphylococcus pyogenes* was grown on culture; tests showed the organism to be resistant to penicillin. She was given "Aureomycin". At about the commencement of that course of therapy she suddenly coughed up a large quantity of purulent, blood-stained sputum. From that moment her condition began to improve. The improvement continued throughout her stay in hospital, and she was discharged, apparently well, on July 2. At that time the erythrocyte sedimentation rate had fallen to five millimetres in one hour, the hæmoglobin value was 13·3 grammes *per centum*, and the leucocytes numbered 7900 per cubic millimetre.

Dr. Calov said that a number of radiological examinations had been made. An X-ray film taken prior to the patient's admission to hospital revealed consolidation in the right upper zone with several radiolucent areas. At the time of her admission to hospital a large cavity containing a fluid level was radiologically apparent. After she had expectorated a large quantity of sputum, the fluid level disappeared. The consolidation gradually disappeared and the cavity closed. The last X-ray film, taken on July 27, revealed some fibrosis of the right upper zone and possibly a small cavity.

Dr. Calov said that the diagnosis was staphylococcal pneumonia complicated by abscess formation. The underlying lesion might be cystic degeneration. Recurrence was possible; in such an event lobectomy would have to be considered.

Shoulder-Hand Syndrome.

DR. E. L. CORLETTE and DR. A. RUMORE showed a female patient, aged sixty-seven years, who had first attended the medical out-patient department on October 2, 1953, complaining of severe pain in the left shoulder running down the left arm and hand. Seven weeks previously she had developed severe pain in the chest and had "collapsed" whilst visiting Melbourne. The patient was told that she had suffered a "heart attack", and had been treated accordingly. The chest pain lasted for some two hours. During the next two days she developed pain and stiffness in the left shoulder and three weeks later the pain moved down into the left arm and hand. One week later the fingers became swollen and stiff.

On examination of the patient, the fingers of the left hand were very stiff, swollen and blue. The palmar fascia was thickened in both hands. The left wrist was swollen and very stiff and painful. The elbow was normal. The left shoulder was painful and stiff, with abduction to 110°. There was very little wasting and the pulses were normal. There was no change in sensation, but the skin was atrophic. The blood pressure was 190 millimetres of mercury, systolic, and 110 millimetres, diastolic. The heart was enlarged. An X-ray examination of the chest showed that the lung fields were clear and the heart was enlarged. In the cervical part of the spine spondylitis was present, and the left shoulder joint was affected by arthritic changes. The Wassermann and Kahn tests gave negative results. The hæmoglobin value was 14 grammes *per centum* and the leucocytes numbered 4200 per cubic millimetre. An electrocardiogram was within normal limits; left axis deviation was present.

Sympathetic block to the left stellate and the two upper thoracic ganglia was performed by Dr. G. Davidson, with great improvement in the colour of the hand and relief of pain. This procedure was repeated two weeks later with more improvement; but pain and stiffness gradually returned, and the block was repeated again two weeks later. Physiotherapy and symptomatic treatment were administered throughout. In December, 1953, slight pain was beginning in the right shoulder. The left hand and shoulder were painful, but the swelling and blueness had gone. The patient gradually developed paranoid tendencies, and for that reason cortisone was not given. At her last attendance, which was recent, the left fingers, wrist and shoulder were stiff, but much improved, with only slight pain. There was slight pain and stiffness in the right shoulder and fingers.

The comment was made that the shoulder-hand syndrome might follow coronary occlusion, hemiplegia, protrusion of a cervical intervertebral disk or cervical vertebral osteoarthritis, injury or any lesion of the shoulder, *herpes zoster*, severe angina or any painful lesion of the chest, arm or shoulder. In many cases the condition was idiopathic. Both arms might be affected. Usually the changes first occurred in the shoulder; but one symptom might precede the others by months, and stiffness of fingers in one hand might be associated with stiffness of the opposite shoulder *et cetera*. The ætiology was unknown; but any painful condition causing reflex spasm of the muscles and ligaments of the shoulder might initiate the syndrome. Treatment was by local anæsthetic injections, paravertebral blocks, block of the stellate ganglion and physiotherapy. In resistant cases cortisone might give excellent results.

Sjögren's Syndrome.

Dr. Corlette and Dr. Rumore also showed a female patient, aged seventy-three years, who had been referred to the surgical out-patient department on October 20, 1953, with the complaint of pain in the right hypochondrium, dryness of the tongue and loss of one stone in weight. Investigations showed a diseased gall-bladder, and laparotomy was performed because of the possibility of carcinoma. A small fibrosed gall-bladder with a stone in the infundibulum was removed. The patient was referred to the medical out-patient department because of cheilosis and dryness of the mouth.

On June 18, 1954, the following history was elicited. Since May, 1953, the patient had not been able to eat—she could not masticate because she had no saliva at all. That symptom had come on rather quickly. Also she had a thick slime on her tongue and mouth. There were no other symptoms, but on further questioning it was elicited that she also had dry eyes and a "jelly" formed on them, and she had no normal tears. Her skin had been dry all her life, and she did not remember ever sweating. She had attended hospital for the treatment of "misty" eyes, but no abnormality had been found.

On examination the patient was a thin, elderly female. Her skin was very dry, her nails were atrophic; her tongue and mouth were absolutely dry and a thick secretion stuck to her throat and mouth; her nose was not very dry. There was little moisture present in the eyes. In the right parotid gland a firm, moderate swelling was detected. She had no arthritis. A number of investigations were carried out. The serum bilirubin content was less than 0·5 milligramme per 100 millilitres. The Wassermann and Kahn tests produced negative results. A fractional test meal examination gave normal findings. The hæmoglobin value was 10·1 grammes *per centum*; the hæmoglobin content of the erythrocytes was deficient. The leucocytes numbered 10,000 per cubic millimetre, 71% being neutrophile cells, 25% lymphocytes and 4% monocytes. The basal metabolic rate was +9%. X-ray examination with a barium bolus and meal revealed no abnormality. Schirmer's test gave positive results with both eyes. Ophthalmological examination confirmed the diagnosis and revealed punctate staining in both eyes and also lens opacities in both eyes. At the time of the meeting the patient was being treated with œstrogens and with pilocarpine (2% solution) by mouth.

The comment was made that Sjögren's syndrome was a condition arising mostly in females. It was of unknown ætiology and resulted in round cell infiltration, atrophy and fibrosis of lachrymal and salivary glands. The usual established syndrome consisted of xerophthalmia, xerostomia, enlargement of the parotid glands and polyarthritis. However, any one of those symptoms might precede the usual eye changes by years, and diagnosis was then more difficult. The lachrymal glands were never enlarged; that fact differentiated the condition from Mikulicz's syndrome. There might be associated anæmia, achlorhydria, Raynaud's phenomenon, and dryness of other mucous membranes. The ætiology was quite unknown; chronic infection, avitaminosis, endocrine deficiency and neurotrophic factors had been postulated. Some patients had shown great improvement when treated with pilocarpine and potassium iodide, some with œstrogens and progesterone, some with vitamin B_{12} and testosterone. Cortisone relieved the parotid swelling, but did not improve the secretion. In two cases great improvement had followed treatment with "Butazolidin".

X-Ray Films of Bronchial Carcinoma.

THE PULMONARY CLINIC (DR. J. SEVIER, DR. F. RITCHIE, DR. M. DECK and DR. J. RAFTOS) demonstrated a series of X-ray films illustrating bronchial carcinoma. Reference was made to the incidence, symptomatology, diagnosis and treatment of that condition, as exemplified in a review of the cases encountered at the Sydney Hospital Pulmonary Clinic over the past seven years.

Cretinism with Hæmorrhage into Thyroid Cyst.

DR. ALLAN FRASER showed a female patient, aged seventeen years, who had been born in the country; she had been breast-fed and apparently normal until the age of six months, when she developed a large tongue, an open mouth and umbilical hernia, and ceased to grow. Mentally she remained very backward, and at the age of nine years she weighed 24 pounds, could not speak, and, according to her mother, was still substantially a baby. At that age cretinism was diagnosed and thyroid treatment was instituted, after which the patient began to grow and her mental status slowly improved. The two other children in the family were normal and neither parent had a goitre. Two years previously the patient's mother had noticed a small lump in the girl's neck, slightly left of the mid-line anteriorly; it had suddenly increased in size three months prior to the meeting, but did not interfere with swallowing or breathing.

When the patient was first examined at the out-patient department on September 1, 1954, after she had been taking one grain of thyroid per day, her physical age was about five years and her mental age about four years. She was a pale little girl, with dry skin and hair, carious teeth, broad nose and puffy eyelids. Secondary sex characteristics were absent. Just to the left of the trachea there was a soft, mobile, fluctuant swelling about one and a half inches in diameter, which moved on swallowing and which displaced the trachea to the right. Bradycardia was present (60 per minute), but her heart showed no abnormality and the other systems appeared normal. X-ray examination of the chest confirmed the tracheal deviation, and a blood count revealed a hypochromic anæmia (hæmoglobin value 10·4 grammes *per centum*). The blood cholesterol values were 235 milligrammes per 100 millilitres (total) and 117 milligrammes per 100 millilitres (ester).

The thyroid dosage was increased to two grains daily, and "Fersolate" (one tablet three times a day) was prescribed. In the three weeks that had elapsed her mother had noticed a definite improvement. The girl had been admitted to hospital for excision of the cyst and further investigation.

Cysticercosis of the Brain with Bronchogenic Carcinoma.

DR. O. SCHMALZBACH discussed a case of cysticercosis of the brain with bronchogenic carcinoma, and showed anatomical specimens. The patient was a man, aged fifty-two years, a widower and a military pensioner. He had been born in England. His father was a saddler, and had died at the age of thirty-eight years from pulmonary tuberculosis. The patient had attended school from the age of four years to fourteen, and had apparently been a good scholar. After leaving school he had worked as a clerk for six years, and later joined the British Army for five years, serving mostly in India. The patient said that he had been infested by a tapeworm in India, as well as having had malaria and entero-colitis there. He married, at the age of twenty-three years, a woman who was eight years older than himself. In 1923 he had begun to take "fits" which, according to the patient's description, had the form of major epileptic seizures. In 1932 he was given a British military pension for cysticercosis of the brain, having had a tapeworm infestation in India. The seizures had sometimes been quite severe, and at other times he had had only minor fits. In 1941 the patient was deserted by his wife, as he said, because he could not support her. He had emigrated to Australia in November, 1952. The seizures had been controlled, not always fully; the frequency of their occurrence varied from one per month to one per week.

In October, 1953, he was admitted to Royal Prince Alfred Hospital. There he complained of headaches, but there was no vomiting, no ataxia, no weakness and no anæsthesia. The epilepsy was aggravated by stooping. Physical examination of the patient showed that the central nervous system was within normal limits; arthritis in the shoulder limited the motor power. No abnormality other than a respiratory wheeze was detected in the chest. The liver and spleen were not palpable, and there were no palpable lymph glands. Whilst at the Royal Prince Alfred Hospital the patient had an attack of *grand mal*. Two days later he had left-sided clonic fits. X-ray examination of the head and shoulders revealed calcification in the left frontal lobe. No abnormality was seen in the left shoulder, but on the right side superomedially there was an area of calcification due to cysticercosis. X-ray examination of the chest revealed increased markings at the right cardio-phrenic angle; it was thought possible that they accounted for vascular shadows due to displacement of the heart from scoliosis and possibly funnel chest.

The patient's second admission to the Royal Prince Alfred Hospital took place on May 11, 1954, and he remained there for four days. He recalled having had a convulsive seizure in the morning of that day, but had only a vague recollection of occurrences during the day. A note which accompanied the patient, from his local doctor, stated that the patient had had a fit before breakfast on that day, and in the afternoon he had begun to have a series of fits, and appeared to be in *status epilepticus*. At 5.30 p.m. he fell off his bed and struck his right eye, sustaining a large hæmatoma. Examination of the patient revealed that all systems were within normal limits, except the respiratory system; the breath sounds were of diminished intensity on the right side, and also there seemed to be respiratory stridor on the right side. Two days later the patient was reported to have been very noisy and aggressive. He was given 10 millilitres of paraldehyde at night and slept for six hours, and then became abusive and fought violently. He could be managed, but he remained somewhat garrulous and excitable. It was considered at the hospital that the patient was particularly dangerous, and he was referred to the Reception House with the diagnosis of cysticercosis of the frontal lobe, convulsions, and epileptic psychosis of organic origin.

At the Reception House the patient said that he had heard his name several times on the wireless, and that he had a special power to hear it when no one else could; he said that the messages were about his last days on earth, and claimed that he had been in touch with his dead wife and mother by telepathy. He was quite convinced that living people were able to communicate with the dead.

He was admitted to the Mental Hospital, Callan Park, where he was aurally hallucinated, produced some delusions (particularly of persecutory character), and had some ideas of reference. His orientation for time and place was correct. His memory was fair. He did not show much insight into his condition. He was suspicious of his new surroundings. Physical examination, followed by an X-ray examination, revealed two small areas of calcification in the frontal lobe, probably due to cysticercosis. He was examined by the chest panel, and considered a suitable subject for bronchoscopy, because of suspected carcinoma of the right lung. The patient's mental condition improved, and his seizures were controlled by anticonvulsive therapy, although he was still having some *petit mal*. A few months after his admission to Callan Park the patient's condition suddenly deteriorated, and a few days later he died with symptoms of respiratory failure.

Dr. Schmalzbach said that the case had some unusual features. Firstly, cysticercosis was a rare disease in Australia. Secondly, one would expect either bronchogenic carcinoma giving rise to metastases in the brain, or cysticercosis in the lungs and brain. In the present case there was the rare combination of the two diseases.

Progressive Muscular Dystrophy of Landouzy-Déjérine Type with Probable Muscular Atrophy of Charcot-Marie-Tooth Type.

Dr. Schmalzbach's next patient was an unmarried man, aged thirty-two years, an invalid pensioner, whose family history revealed that one maternal uncle was a heavy alcoholic and another uncle had been suffering from pulmonary tuberculosis. The patient's father was a builder; he deserted the family when the patient was an infant. The patient was the youngest in a family of five children. He attended a State school and reached fifth class. According to his mother he was born "crippled" with deformities of hands and legs. After leaving school he did odd jobs around the home, but he would not work because of his disability, and was put on an invalid pension prior to his admission to the Mental Hospital, Callan Park, in 1948. His family life did not appear satisfactory. The patient's environment at home was not pleasant; he used to have arguments with his eldest sister, who, as his mother expressed it, "was always chipping him".

He was admitted to Callan Park as a certified patient on March 9, 1948. His history revealed that he had developed delusions about being poisoned by food which began to have a funny taste. He believed his siblings were very much against him, and also his mother. It appeared that the patient was aurally hallucinated. He used to hear voices abusing him and using bad language. He was foolishly euphoric and his orientation for time and place was poor. He had a fair memory, his speech was dysarthric, his ideation was retarded, he was untidy in his habits, and he showed no insight into his condition. His intelligence level was low, although he was not classified as a mental defective. During his stay in the mental hospital his condition remained more or less stationary, except that from time to time he was impulsive and had proved to be aggressive. Physical examination revealed muscular dystrophy involving the whole of the lower extremities; in the upper extremities the muscular dystrophy involved the shoulder girdle—he had *scapulæ alatæ*. There was a diffuse muscular dystrophy involving the distal part of the upper limbs, particularly the small hand muscles. His movements were limited. His facial musculature was atrophied. His face had a sad appearance—*facies myopathica*. His gait was impaired, and he waddled and was slow. The reflexes were diminished generally, but preserved. The knee and ankle jerks were present and equal. There was no spasticity, the plantar responses were flexor, and no other pyramidal signs were present.

A number of investigations were carried out. The urinary creatinine excretion was 0·7 gramme per twenty-four hours; the creatine excretion was 0·15 gramme per twenty-four hours. The blood creatinine content was one milligramme per 100 millilitres; the blood creatine content was 7·5 milligrammes per 100 millilitres. At Sydney Hospital the following further investigations into the blood chemistry were carried out: estimations of the blood urea nitrogen, blood creatinine and blood creatine contents; estimations of the serum protein, sodium, potassium, chloride and cholesterol contents; all results were within normal limits.

Dr. Schmalzbach said that it appeared that the patient represented a picture of progressive muscular dystrophy of Landouzy-Déjérine type. There were a few features which led one to think that that form was probably combined with the Charcot-Marie-Tooth type of muscular atrophy. The atrophy of the patient's lower limbs and the history as given unsatisfactorily by his mother (who said that the patient was "born" with deformities of hands and feet) did not exclude the possibility of that combination of the two types. That was also a confirmation of the opinions expressed by others, that the clinical entities and syndromes of muscular disorders were not strictly defined.

Adrenal Tumour.

DR. A. P. FINDLAY showed a man, aged forty-six years, who was born in Greece and had lived in Australia for twenty-four years. He complained of pain in the left side of the abdomen of four months' duration; he had had recurrent attacks of malaria, but none for the last three years. He had a persistent severe microcytic hypochromic anæmia, and examination showed a large tumour mass occupying most of the left side of the abdomen, which was diagnosed as an enlarged spleen.

At operation a spleen weighing 810 grammes was removed, and then a large encapsulated retroperitoneal tumour was found in the left flank. This was adherent to the diaphragm above and was displacing the left kidney down below the pelvic brim. On removal, it weighed 1600 grammes and was diagnosed as an adrenal cortical adenoma.

Dr. Findlay said that the patient had made a rapid recovery from the operation and had remained well since. At no time had there been evidence of either endocrine or metabolic disturbance. No cause for the splenic enlargement was discovered.

(To be continued.)

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

THE SYDNEY DISPENSARY.[1]

[From *The Sydney Gazette*, June, 1826.]

As many of the Free Class of the Poor Inhabitants of the Town of Sydney when suffering from Disease are unable to pay for Medical Advice and not having any claims on the Government Medical Establishments are frequently doomed to linger on the bed of sickness and perhaps at length fall victims to its painful effects, it becomes necessary to appeal to the Benevolence of the richer Inhabitants to endeavour by their Assistance to avert the Evils to which their poor Neighbours are subject. It is therefore proposed to establish a Dispensary in the Town of Sydney on the Plan of those that have been found so extensively useful in all the principal Towns of the Mother Country. Donations and Subscriptions are earnestly solicited to carry into effect the benevolent Intentions of the Proposers of the Institution.

His Excellency the Governor being fully impressed with the necessity and importance of such Institutions has been pleased to signify his Intention of granting every Assistance to promote the best Interests of the Institution and the undermentioned Medical Gentlemen have offered their services gratuitously:

Mr. Bowman, Principal Surgeon of the Territory, Mr. Ivory, Mr. Mitchell, Mr. Doyle, Mr. McIntyre.

It is proposed that a suitable Home shall be hired or purchased in some convenient situation in the Town and a Person appointed, duly qualified, to reside there, and to administer such Medicines as may be ordered by one of the Medical Officers of the Institution, one of whom will give his Attendance every day from 11 till 12 for the Purpose of

[1] From the original in the Mitchell Library, Sydney.

prescribing for such Patients as may come properly recommended; and such of the Sick as are confined to bed and thereby incapable of attending personally at the Dispensary will be visited at their Habitations if they reside within the Town of Sydney.

An annual Subscriber of £1 to have the privilege of recommending one patient at a time—subscribers of £2 two patients and so on.

It is also proposed that a Committee be formed and that the Town be divided into Districts and one of the Members of the Committee be appointed to each District for the Purpose of soliciting Subscriptions and Donations for the support of the Establishment and to whom all Applications shall be made by the Poor for Recommendations and who will ascertain that they are proper Objects of Charity.

Patron, His Excellency the Governor.

Subscriptions will be received at the Colonial Hospitals, at each of the Military Hospitals, and at the Gazette Office.

Correspondence.

MEDICAL OFFICERS ON SHIPS.

SIR: I think that we are very fortunate in being able to see the world at the expense of the shipping companies. I have done trips as a uniformed surgeon and also in plain clothes, and I do not consider I was any less useful or less efficient in the latter capacity. Even though I see Dr. Dillon's point of view, I should nevertheless hate to see all these posts filled permanently. Maybe I shall one day want to do another voyage myself.

Yours, etc.,

19 Rockingham Road,
Rockingham,
Western Australia.
February 21, 1955.

MARTIN SAWDAY.

LUNG CANCER AND SMOKING.

SIR: Recent published papers followed by widespread Press publicity have resulted in considerable, although justifiable, concern over the dangers of smoking. There is a danger of neurosis developing in individuals who find themselves unable to give up the habit but are nevertheless deeply alarmed by the repeated warning statements in the Press. Research projects, both statistical and experimental, are being carried out in several countries on a large scale, and the tobacco companies are contributing generously to such research. It is important, however, to keep a sense of proportion in such matters and not unduly alarm a public which already has a deep-rooted fear of cancer.

Russ (1954) concludes from the statistics that in England and Wales, for every ten-cigarette-a-day man with lung cancer, there are about two hundred similar smokers without such cancer. On the other hand, Heady and Barley (1953) derive that the chance of dying from lung cancer is increased 15 times in the moderate smoker over the non-smoker. The moderate smoker therefore, according to the most gloomy statistical interpretation, takes a one-in-twenty chance of developing lung cancer.

These are the results of investigations of the smoking habits of lung cancer patients compared with carefully matched control series which now have been carried out in four countries. The difficulty must be stressed, however, of taking into account both present and past tobacco consumption and its fluctuation in time, in view of the long latent interval (possibly twenty to thirty years) necessary for a carcinogen to exert its effect.

Several conflicting points must be taken into consideration before categorical statements as to cause and effect can be made.

1. The rise in the death rate from lung cancer has been particularly marked since 1920 throughout the world; thus, in England and Wales the recorded death rate has increased by fourteen times in the last twenty-five years (Doll, 1953). Over the same period the recorded incidence in Australian males has increased only six times (Lancaster, 1953). The death rate from cancer of the lung in the period 1940-1945 is, thus, approximately three times as high in England and Wales as in Australia. This very much higher incidence cannot be correlated with the tobacco consumption, which has been very similar in both countries for the last twenty-five years. Thus British tobacco consumption has risen from 3·0 pounds per head in 1925 to 4·5 pounds per head in 1950 (of which about three-quarters would be in the form of cigarettes), while the Australian tobacco consumption has risen in the same period from 3·5 pounds per head to 4·99 pounds per head. That the difference in lung cancer incidence between England and Wales on the one hand and Australia on the other is not due to failure of diagnosis is shown by the non-lung cancer incidence being less than one and a half times as high in the former as in the latter. Furthermore, the United States of America has a slightly higher lung cancer incidence compared to Australia, although the tobacco consumption in the United States for the last fifty years has been about twice as high per head as that of Australia. (It may be noted that a possible explanation is that the cigarette consumption between twenty and thirty years ago in the United States was little different from that of Australia. An additional point that may prejudice the statistics is that the average North American discards a larger part of his cigarette unsmoked, and it is likely that tobacco tar concentrates in the cigarette end.)

2. Another point that requires investigation is the marked difference in lung cancer mortality rates between town and country dwellers. In England the death rate from lung cancer in males is twice as high in London as in the rural areas and greatest in one part of London that may receive the highest density of smoke-laden air (Stocks, 1952). Similar observations have been made in the Scandinavian countries. Whether this difference is due to the presence of radioactive material, arsenic or carcinogenic hydrocarbons found in the air is a matter of conjecture, but atmospheric pollution in towns arises principally from chimney smoke, the dust off tarred roads and car exhaust gases. Experimentally, these materials have been shown to be more carcinogenic in the case of mice than tobacco (Campbell, 1937), although it has recently been demonstrated that tobacco tars are carcinogenic in their ability to induce skin cancer when painted on the skin of experimental animals (Wynder *et alii*, 1952), and there is one recent report of a carcinogen (3:4 benzpyrene) having been found both in burnt tobacco and in burnt cigarette paper (Cooper *et alii*, 1954). The results of animal experiments cannot, of course, be applied to the human without careful consideration of all factors; and if the disease is associated with atmospheric pollution, it is difficult to explain the difference between the male and female incidence. As far as the human is concerned, the best established ætiological factor in the case of lung cancer has been recorded in the case of the Schneeberg and Joachimstal mines in Germany. Over half of the miners engaged in these mines die of lung cancer. The air in the mines contains a proportion of iron, cobalt, nickel, silica and arsenic in the dust, and in addition, some radioactive material, especially radon. Doll (1953) notes that occupations which have been recognized as involving an increased risk of lung cancer are chromate production, nickel refining, asbestos manufacture and the production of coal gas, and the list is extended to probably include arsenic handling and possibly iron dust and silica exposure. It thus appears that atmospheric pollution is a very potent factor in the development of lung cancer as shown in industry and experimental work.

3. Another question that presents itself with relation to the association between tobacco smoking and lung cancer is why there has been no corresponding increase in the last twenty-five years in the incidence of cancer of the upper respiratory tract (mouth, tongue, pharynx and larynx), these being equally exposed to the smoke. In fact, the death rate from cancer of the mouth and tongue is decreasing in the United Kingdom. (Some countries, however, have noted a relationship between the amount smoked and the development of cancer of the larynx.)

4. It is also possible that the smoking habit and the development of lung cancer can be related to a third common factor—namely, persons with a particular constitution may be prone to smoke heavily and, at the same time, have a predisposition to lung cancer. Thus, Doll and Hill's (1954) recent analysis of death certificates of British doctors shows an increasing tendency to coronary thrombosis with increasing tobacco consumption. Smoking may not be incriminated as a major factor in the production of coronary disease, but there may be a factor in common; for example, the over-active nervous type may smoke heavily and be liable also to coronary disease. In this respect hereditary predisposition may be of importance to explain racial differences in susceptibility to lung cancer, although the environmental factor is probably more important. It is also possible that

the agent in tobacco may be a co-carcinogen which acts by enhancing the effect of another carcinogen such as the polluted atmosphere of towns. Thus, the effect of the two combined is greater than would be expected from their simple addition.

To quote from Doll (1953): "To summarize, most of the known epidemiological facts about bronchial carcinoma are consistent with the effects of a limited number of industrial carcinogens and the presence of a carcinogenic substance in tobacco smoke—particularly in that derived from cigarettes. *An exception may be the relatively low mortality from the disease in the U.S.A.*"

The Advisory Committee to the Minister of Health in England (1954) has reported that it must be regarded as established that there is a relationship between smoking and cancer of the lung, although it is unlikely that the incidence of cancer of the lung is due entirely to an increase in smoking. They recommend that it is desirable that young people be warned of the risks apparently associated with excessive smoking. Most will concur with this recommendation; but in view of the undoubted relationship of atmospheric pollution and the many questions yet remaining to be solved, one would have been happier for the recommendation to advise also that the authorities prevent the pollution of the atmosphere of our cities. All bodies of statistics show an increased incidence of lung cancer in urban areas, and the presence of known carcinogens in the air of these cities is well established.

May I sign myself as a smoker,

Yours, etc.,

Melbourne, March 16, 1955. BASIL A. STOLL.

Obituary.

ARTHUR MADGWICK DAVIDSON.

DR. ARTHUR MADGWICK DAVIDSON, of Enmore, New South Wales, who died at his home on January 20, 1955, struggled for the last years of his life against mental stress and anxiety that were thrust upon him, with a courage and faith that were peerless, proclaiming to all who came into close contact with him his nobility of character and his intrinsic worth. That arterial hypertension should take toll of his physical condition was inevitable, and he died before his time, respected and held in high honour by large numbers of men and women, members of the medical profession and outside its ranks.

Arthur Madgwick Davidson was born in October, 1891. His father was a bank manager at Brisbane and he received his early education at the Brisbane Grammar School. He studied medicine at the University of Sydney, graduating as Bachelor of Medicine and Master of Surgery in 1915. These were strenuous days and Davidson joined up with the Australian Imperial Force; he served until 1919. He was decorated Officer of the Most Excellent Order of the British Empire and he was also mentioned in dispatches. During the Second World War he acted as medical officer to various units in the lines of communication in the eastern area. On his return from active service after World War I, he started practice in Enmore and remained there till the day of his death. He quickly built up a reputation as a sound and reliable practitioner and was called upon to give his services in many directions. He became identified early in his days at Enmore with the Marrickville District Hospital and became one of its honorary surgeons. He was honorary obstetrician to the "Bethesda" Hospital, an institution run by the Salvation Army. Here he created a clinic which was of the greatest benefit to those who had to seek advice at the institution. The officers of the Salvation Army thought the world of him and showed their appreciation of his services in many ways; some of them were present at his funeral service in Christ Church, Enmore. He was senior medical officer to the "Braeside" Maternity Hospital controlled by the Church of England, and he was one of the list of obstetric consultants named under the Maternal Welfare Scheme by the Department of Public Health in New South Wales. He was honorary medical officer to the students of Moore Theological College, an institution controlled by the Church of England. During the Second World War he was for some considerable time acting assistant surgeon at the Royal Prince Alfred Hospital.

Davidson was a member of the British Medical Association and took a prominent part in its affairs. He was elected a member of the Branch Council in 1930 and sat continuously until 1946; he was President in the year 1935. This year was the year during which the Parent Body of the Association journeyed to Melbourne to hold the 103rd annual meeting. Davidson had the honour of welcoming the large delegation from Great Britain when it arrived in Sydney on the way to Melbourne, and he not only enjoyed doing this but did it with distinction. During discussions on Council matters, he always expressed sound views and commanded the attention of his fellow councillors. It was largely owing to his advocacy that the Branch started the organization known as Medical Finance, Limited, which enabled young graduates returning from the Second World War to finance the buying of a practice. Arrangements were made to this end with the Bank of New South Wales, and the organization is still carrying on effectively.

It was as one of the directors of the Australasian Medical Publishing Company, Limited, that Davidson came into close contact with THE MEDICAL JOURNAL OF AUSTRALIA. The chairman of directors, Dr. T. W. Lipscomb, was planning a trip to England, and it was decided to appoint a second director in New South Wales who would act for him during his absence and assist him after his return. The choice fell on Arthur Davidson and it was a very happy one. As a member of the Board and of the Local Committee of Directors, which meets once in every month, he showed vision and judgement. His criticism was nearly always constructive and he never failed to give a sound opinion to the Editor of the journal when his advice was sought. It was a great grief to everyone connected with The Printing House when he severed his connexion with the Australasian Medical Publishing Company, Limited. At the meeting of the Board of Directors of the Company, held at Melbourne on February 13, 1955, the chairman referred to the "respect and affection" in which Davidson was held and a motion of sympathy with his wife and family was carried.

The respect and confidence which the community had in him were shown in a striking fashion at his funeral service, which was held in Christ Church, Enmore. Representatives of the New South Wales Branch of the Association and of THE MEDICAL JOURNAL OF AUSTRALIA attended as well as many medical practitioners who went on to the service at the Crematorium. The Most Reverend H. W. K. Mowll, Anglican Archbishop of Sydney and Primate of Australia, attended and gave an address. He said that they had all come together at that service full of thankfulness for all that the life of service, of affection and of friendship of Arthur Madgwick Davidson had meant to that church, to Enmore and to the community in general. The Archbishop then went on to trace Davidson's professional career and mentioned most of the facts which have been already stated. He laid particular stress on Davidson's service to Bethesda Hospital, to the Braeside Church of England Hospital and to the Moore Theological College. Among other clergy present were the Venerable Archdeacon T. C. Hammond, the Reverend B. T. Butcher, of the Congregational Church and the London Missionary Society, the Rector of Christ Church, Enmore, and several other clergy.

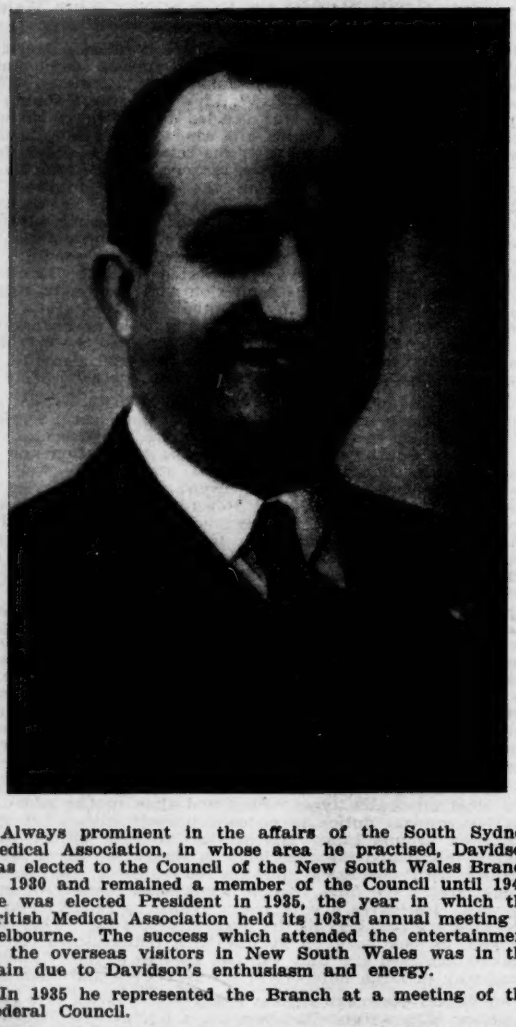
Arthur Madgwick Davidson was a general practitioner of the most admirable type. He found time in the midst of his professional duties to concern himself with what was going on around him. His services to this journal were highly valued and his experience in the reviewing of books dealing with obstetrics and kindred subjects was keenly appreciated. We have tried to show what manner of man he was. He leaves a wife and a grown up family; two of the sons are members of the medical profession. They will be able to look back on his life with thankfulness for all that he achieved and they will feel assured of the respectful sympathy of large numbers of his colleagues and friends.

SIR HENRY NEWLAND writes: I was first brought into close relations with Arthur Davidson when I joined the Board of the Australasian Medical Publishing Company, Limited, of which he was then a director. The courtesy and friendliness of his welcome at once attracted me to him. These qualities were in evidence throughout the period during which we were colleagues. He had a gentle, modest, winning nature, tireless energy, was capable and consequently acquired a very large practice. He had, too, a flair for finance in common with his distinguished brother, the late Sir Alfred Davidson. This link was not without its value to the Board of the Publishing Company.

Davidson, recognizing that the young medical graduate is often short of capital when about to embark in practice, was mainly instrumental in founding a company in Sydney, known as "Medical Finance, Limited", to provide the means.

The company acted in association with the Bank of New South Wales, which advanced money on the security of a life insurance policy. Encouraged and greatly helped by Dr. Davidson, I was in process of forming a similar company in Adelaide when the outbreak of World War II frustrated what he and I had in view. The basis of a reputation for financial and moral integrity is the trust of one's fellows. Davidson was trusted and right well he deserved to be. His name and memory will endure untarnished in the annals of the company he served so well.

DR. J. G. HUNTER writes: The passing of Dr. Arthur M. Davidson has caused a gap in the ranks of those who have given long and yeoman service to the British Medical Association and the profession generally.



Always prominent in the affairs of the South Sydney Medical Association, in whose area he practised, Davidson was elected to the Council of the New South Wales Branch in 1930 and remained a member of the Council until 1946. He was elected President in 1935, the year in which the British Medical Association held its 103rd annual meeting in Melbourne. The success which attended the entertainment of the overseas visitors in New South Wales was in the main due to Davidson's enthusiasm and energy.

In 1935 he represented the Branch at a meeting of the Federal Council.

During the sixteen years he served on the Branch Council the Association's welfare was his chief interest and he made many sacrifices on its behalf. He possessed great powers of concentration and a marked degree of foresight. In meetings he spoke clearly, forcibly, if at times brusquely, and to the point, and from first to last was a constructive critic.

As a Branch representative and one of its directors, he gave powerful support to the managerial and editorial sides of the Australasian Medical Publishing Company, Limited.

He was largely responsible for the formation by the Branch of the British Medical Agency of New South Wales, Limited, and Medical Finance, Limited, and the success of these two bodies owes much to Davidson's initiative.

To the Branch secretariat he was a wise counsellor and a pillar of strength and his courtesy and kindliness of heart will long be remembered.

DR. W. F. SIMMONS writes: Arthur Davidson was my friend for thirty-five years. We commenced general practice about the same time after World War I when a number of new problems were presenting themselves in general practice.

The Council of the New South Wales Branch of the British Medical Association was negotiating a new Common Form of Agreement with the friendly societies, the Repatriation Medical Service was being established, while within a year or two of these developments the very first schedule of fees for workers' compensation cases was a matter of negotiation between the Council of the New South Wales Branch and the Associated Licensed Insurers.

In all these matters general practitioners were vitally concerned and the local associations of the British Medical Association, particularly in the metropolitan area, were very active. Davidson was one of the leaders in his local association, and as I happened to be the honorary secretary of my own local association we had many long discussions together. It was at this time that I first appreciated his loyalty to principles and his absolute fairness in negotiation. He marshalled his facts well and presented them concisely. It was felt by the general practitioners at the time that there was not adequate representation of general practitioners on the Council of the New South Wales Branch, and mainly owing to the good work done by Davidson two more general practitioners were elected to the Council. When one of them, Dr. J. G. Hunter, was appointed assistant medical secretary of the Branch, Arthur Davidson succeeded him on the Council, and from that time onward he threw himself whole-heartedly into the work of the Council. He was elected honorary secretary of the Medical Politics Committee of the Council, and no honorary secretary of any council committee ever gave as much time to its work as Davidson did. Feeling the need of a medical agency to provide a service for its members, Davidson threw himself into this venture whole-heartedly, and when he discovered that it would be necessary to have a finance company to assist deserving cases he single-handed arranged with one of our leading banks to provide the necessary finance. Shortly after the successful establishment of these two companies the problem of the staffing of the non-teaching metropolitan hospitals became a matter of great importance to the general practitioners who at that time were honorary medical officers of the hospitals in their districts.

Arthur Davidson was senior surgeon at his hospital and at the same time a member of the board of the hospital. He had the loyal support of the honorary medical staff and also of the lay hospital board, and his wise counsel made it possible for reasonable adjustment of the staff to be arranged.

How Arthur Davidson was able to do the vast amount of work he did passes my comprehension. He was senior honorary surgeon to his district hospital, senior honorary obstetrician to two church hospitals, area medical officer for Marrickville, and visiting medical officer to the personnel depot there as well as conducting one of the biggest single-handed practices in the metropolitan area.

In addition he gave a lot of voluntary service to his church and the Salvation Army as well as other worthy causes which were known to himself alone. He was a man of sterling character who gave himself whole-heartedly to any cause he considered worthy of his help. His loyalty to his patients and his friends was witnessed by the crowded church at his funeral service.

We his friends gained inspiration and help from his innate enthusiasm and loyalty. He was a unique personality. *Ave atque vale*!

DR. A. C. THOMAS writes: In the first term of the academic year 1910 Arthur Davidson and I met as freshmen at the University of Sydney. He had come from Brisbane where he had attended the Brisbane Grammar School and where his father was the manager of the South Brisbane branch of the Bank of New South Wales. It was early evident that he was a real family man, proud of his ancestry and of his family associations. This trait in his character he carried throughout his life, and in his own home he was a most devoted husband and father.

Even as an undergraduate Arthur Davidson showed himself to be a man of forceful character and strong personality. When he came to a decision he would advocate and stress his opinion in face of the strongest opposition. It was this phase of his character which made him so useful as a

member of the Council of the New South Wales Branch of the British Medical Association and on the Board of the British Medical Agency, on both of which I was his colleague for some years. He had a much firmer grip on financial affairs than is usually seen in medical men, doubtless owing to his family tradition.

The institution of Medical Finance, Limited, which has helped so many young practitioners, was largely due to his influence and organization.

The friendship commenced in 1910 existed throughout the years and our respective families often met socially. In other walks of life, too, I was his associate. This gave me ample opportunity of gauging the worth of the man whose life had been devoted to the service of his fellows. He loved his profession and was always willing to give of his best in its practice and was jealous of its reputation.

Not only will his loss be felt by his widow, his two daughters and his three sons (two of whom are members of our profession, while "Jummy" holds high rank in the Royal Australian Air Force), but also by his colleagues and many patients.

Royal Australasian College of Surgeons.

PRIMARY EXAMINATION FOR THE F.R.A.C.S.

A PRIMARY EXAMINATION in anatomy (including normal histology) and applied physiology and the principles of pathology will be conducted in Melbourne and in Sydney in September, 1955. The written papers will be held simultaneously in both cities on Thursday, September 8, and Friday, September 9, 1955. The examiners will visit both cities for the purpose of conducting the viva voce section of the examination.

The examination is reciprocal with the primary examinations for Fellowship of the Royal College of Surgeons of England, the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, and the Royal Faculty of Physicians and Surgeons of Glasgow.

Each candidate will be notified by post of the result at the termination of the examination.

The examination is open to graduates of not less than one year's standing of a medical school approved by the Council of the College for the purpose. Candidates must submit evidence of their qualification and of the date of acquirement thereof.

Forms of application for admission to the examination may be obtained from the Secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne. When entering for the examination, candidates must state whether they desire to appear before the Board of Examiners in Melbourne or in Sydney. The fee for admission, or readmission, to the examination is £15 15s. Australian currency (*plus* exchange on cheques drawn on banks outside Melbourne). The fee must be forwarded with the form of application so as to reach the Secretary at his office not later than July 28, 1955.

Research.

HARRISON WATSON STUDENTSHIP FOR MEDICAL RESEARCH.

THE Governing Body of Clare College, Cambridge, invite applications for a Harrison Watson Studentship commencing on October 1, 1955. The Studentship, which is open to male graduates of any university in any country, is for research or training in research into the causes and cure of tuberculosis and/or other diseases of an allied character. The Governing Body intend to interpret these terms in the widest possible sense and they invite detailed inquiries about (i) a Junior Studentship of value between £500 and £650 a year, normally tenable for three years, or (ii) a Senior Studentship of value between £800 and £1000 a year, tenable for one, two or three years. The student may also hold another award or post, and may engage in a limited amount of teaching, if in the opinion of the Governing Body these do not interfere with his research. The Student will be

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 12, 1955.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.[2]	Northern Territory.[2]	Australian Capital Territory.[2]	Australia.[3]
Acute Rheumatism	4(1)	4(1)	11(9)	1(1)	3(2)	..	..	..	23
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	7(7)	15(12)	7(6)	..	1	..	..	..	30
Diphtheria	3(2)	3(3)	1(1)	..	9(9)	..	..	..	16
Dysentery (Bacillary)	..	1(1)	5(5)	..	1(1)	..	..	..	7
Encephalitis	..	..	..	..	..	..	..	..	..
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	44(17)	54(19)	..	..	3	..	..	..	101
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	..	..	1(1)	..	..	..	..	..	1
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	7	15(9)	13(1)	6(4)	..	..	..	..	41
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	18(11)	..	..	2(1)	..	..	..	20
Salmonella Infection	..	..	..	..	2(1)	..	..	..	2
Scarlet Fever	7(5)	17(10)	3(1)	3(2)	..	..	..	..	30
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	2(1)	1(1)	..	..	..	..	3
Trachoma	..	..	..	..	4(1)	..	..	..	4
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	46(34)	21(19)	2(1)	10(10)	16(10)	..	..	..	95
Typhoid Fever	..	..	1	..	2(2)	..	..	..	3
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from Tasmania, Northern Territory and Australian Capital Territory.

required to become a member of Clare College and the University of Cambridge, and to reside and work in Cambridge. Applications should contain an account of the applicant's career, and a general statement of his proposed course of research. No testimonials need be submitted, but the names and addresses of no fewer than two referees should be sent. Applications and inquiries should be addressed to the Master, Clare College, Cambridge, England. The closing date for applications is April 16, 1955.

Post-Graduate Work.

TREATMENT OF CANCER IN THE UNITED STATES.

ADVICE has been received from the United States Embassy in Canberra that Australian medical practitioners who are in the United States this year will be given opportunities to observe facilities and techniques used in the treatment of cancer. The American Atomic Energy Commission is arranging three tours, beginning on June 15, September 7 and October 9, for leading senior physicians and surgeons interested in the treatment of cancer. Australian medical practitioners who plan visits to the United States this year and are interested in obtaining more information about the tours may address inquiries to the Public Affairs Officer, United States Embassy, Canberra, A.C.T.

Congresses.

ASIAN-PACIFIC TUBERCULOSIS CONFERENCE.

THE Asian-Pacific Tuberculosis Conference will be held in Sydney from August 15 to 21, 1955, the week preceding the Australasian Medical Congress (British Medical Association). As well as interstate visitors and representatives of South-East Asian countries, other eminent delegates will be attending from North America, the United Kingdom and Europe, including Dr. Johannes Holm, Chief of the Tuberculosis Section, Division of Communicable Diseases, of the World Health Organization. The programme includes discussions on B.C.G. vaccination and tuberculosis control and treatment. A limited amount of accommodation will be available for interstate visitors in Wesley College, at the University of Sydney. Further information may be obtained from Dr. Bruce Geddes, the Conference Secretary, The Royal North Shore Hospital of Sydney, Crow's Nest, New South Wales.

SEVENTH INTERNATIONAL CONGRESS OF COMPARATIVE PATHOLOGY.

THE seventh International Congress of Comparative Pathology will be held in Lausanne, Switzerland, from May 26 to 31, 1955. Subjects for discussion at the scientific meetings will include viral diseases transmitted to man by animals, atmosphere pollution and growth disturbances in comparative pathology. Further information may be obtained from the General Secretariat, 19 rue César Roux, Lausanne, Switzerland.

Nominations and Elections.

THE undermentioned has applied for election as a member of the Victorian Branch of the British Medical Association:

Lewis, Zara, M.B., B.S., 1944 (Univ. Sydney), 19 Pratt Street, Moonee Ponds.

The undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Moore, Keith Patrick William, M.B., B.S., 1952 (Univ. Sydney), c.o. Dr. Scarlett, Inverell, New South Wales.

Medical Appointments.

Dr. T. H. R. Mathewson has been appointed a member of the Nurses and Masseurs' Registration Board of Queensland.

Dr. H. M. Fisher has been appointed to the Board of the Launceston Public Hospitals District as the representative of the medical practitioners residing in that district.

Deaths.

THE following deaths have been announced:

HARDIE.—John Hardie, on January 12, 1955, at Brisbane.

CROWE.—Edward John Crowe, on March 17, 1955, at South Yarra, Victoria.

Diary for the Month.

APRIL 5.—New South Wales Branch, B.M.A.: Council (Election of Officers).
APRIL 6.—Victorian Branch, B.M.A.: Branch Meeting.
APRIL 6.—Western Australian Branch, B.M.A.: Branch Council.
APRIL 8.—Tasmanian Branch, B.M.A.: Branch Council.
APRIL 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.
APRIL 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.